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Finance & Administration

På denna sida hittar du BANQITs ekonomiinformation.
Eva Löfstedt ser till att sidan är uppdaterad, så om du har frågor och/eller synpunkter, kontakta Eva (ankn 4739).

Bokslut
Bokslutsinformation

Exportkontroll
Internt Exportkontrollprogram
Partnerbrev - ExportGuidelines

Fakturering
Om Fakturering

Inventarier
Om Inventarier

Kostnader
Allmänna Kostnadskonton
Attestinstruktion
Kostnadsreserver
Kostnadsställen
Representation

Leverantörsavtal
Förteckning över aktuella leverantörsavtal (Word.doc)

Valutor
Valutakurser 2008
Valutakonverter (Externt webbverktyg)

Årsredovisning
Års- och Koncernredovisning för räkenskapsåret 2007 - svensk (pdf)
Års- och Koncernredovisning för räkenskapsåret 2006 - svensk (pdf)
Års- och Koncernredovisning för räkenskapsåret 2005 - svensk (pdf)
Års- och Koncernredovisning för räkenskapsåret 2004 - svensk (pdf)
Års- och Koncernredovisning för räkenskapsåret 2003 - svensk (pdf)
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Års- och Koncernredovisning för räkenskapsåret 2002- svensk (pdf)
Års- och Koncernredovisning för räkenskapsåret 2002 - engelsk (pdf)

Extern webb Information
Riksbanken
Skatteverket
Statistiska Centralbyrå

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Information and Routines

Instruktioner

Område	Titel
Användning av telefon	Telefonpolicy
Användning av PC och nätverk	Användarpolicy for PC och Nätverk
Arrangemang av kundbesök	Rutin för kundbesöksplanering med hjälp av resebyrån Hansen
Befogenheter	Attestinstruktion
Beställningar/Inköp	När vi beställer varor och tjänster
Blanketter/Mallar	Blanketter Användning av Mallar och Blanketter
Brand	Åtgärder vid BRAND
Förbättringar	Förbättringar
Företagsbeskrivningar	Företagspresentationer
HelpDesk	Lathund för användning av HelpDesk.
Kundnummer	Lista på resp. bolags kundnummer hos leverantörer
Larm- och Passersystem	Larm- och passersystem Kronborgsgränd 19
Parkering	Parkering Ärvinge - Parkeringsregler
Sophantering	Sophantering
Tidrapportering	Omvandlingstabell för övertids- och frånvarokoder
Tjänsteresor	Resereglemente Regler angående resebeställning Kontaktinformation från VIA Travel
Utlandsplacering	Övertidsersättning vid Utlandsuppdrag Allmänna villkor vid Utlandsplacering
Varumottagning	Varumottagning
Våra lokaler	Belysningen i våra lokaler, Kronborgsgränd 19 Ventilation i Ärvinge under helger och kvällar

- Documentation
- Finance
- JIRA
- Personnel
- Service
- Telephones
- Terminology
- Tools
- IT System

Subpages (3): Internal Service Purchases Web Edit Information

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HW Development

Peer-Åke Eskelius	Claes Björkman	John-Olle Helmersson
Roland Forsberg	Lars Svensson	Jan Mistander
Torbjörn Nyström		

Vi ansvarar för framtagning av hårdvaruprodukter inom självbetjäning.
I detta ingår mekanisk-, elektronisk- och firmware- utveckling.
Det omfattar att förstå kundkrav, genomföra förstudier, konstruera, ha kontakt med leverantörer, skriva manualer, produktionssätta, underhålla, etc.
Vi är ett glatt gäng som blandar erfarenhet med ungdomlig entusiasm, för att någon gång få ta emot Självbetjäningens "Oscar" !!

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Vacation and Planning

Everybody at BANQIT belongs to a department. The head of each department (SW, HW, FW, Test and Support) is responsible for allocating resources to projects according to requests.

The development work at BANQIT is conducted in the form of projects. Each project has an appointed project leader. The project leader is responsible for the planning and managing resources allocated to his/her project. The project leader is also responsible for requesting resources for the upcoming work tasks in the project. The department heads are responsible for requesting and managing resources for line oriented work in the same fashion as project leaders.

Work tasks that lack a defined end date are not suitable for projects. Typical examples are; administrative tasks, continous process improvement work, management, customer support, sales and spare part distribution. Employees which are exclusively occupied by this kind of work are not allocated through the described planning process.

Vacations and planned absence is important input to the resource planning process. To avoid duplication of administrative tasks, the same web page is used for both planned absence and for resource planning. It is the responsibility of the department managers to update the web page with resource allocation and absence information.

Vacation List

Guidelines

- The goal is to have a minimum planning horizon of 8 weeks for the resource allocation. The resource allocation is done at regular, pre planned intervals.
- If more resources are requested than is available and it is not possible to solve the conflict by negotiations between the line manager and the project leaders, the resource allocation is escalated to the BANQIT project steering committee.
- It is the responsibility of each coworker to secure that he/she is working within his/hers allocated scope.
- To avoid detail management the minimum resource allocation is a work week.
- A coworker may be allocated to two projects at the same time. This means that the employee is supposed to work roughly half time in each project. The exact distribution of work during the week is decided by the coworker and the two responsible project leaders/managers.
- If someone breaks the agreed resource allocation and orders a coworker to work within another area than he/she is allocated to or more time than has been agreed upon, it is the responsibility of the department manager to rectify the problem.

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Internal Service

OMRÅDE	FÖLJANDE GÄLLER:
Bud/Kurirsändningar	All budkörning av brev, dokument, ritningar, etc. inom Stor-Stockholm sker med externa budbilar (BEST). Behöver du skicka brådskande dokument eller paket använder vi oss av TNT.
Fastighet/Säkerhet	Fastighets och Säkerhetsfrågor hanteras av Eva Löfstedt#4676. (Kvällstid 0708 759 130.)
Kaffemaskinerna	Dagligt underhåll görs av Städsystem (vår lokalvårdare). Regelbunden service görs av Kaffeknappen.
Konferensrum	Det finns två konferensrum och ett s k "tyst rum". För mer info om konferensrummen och om hur de bokas, seKonferensrumsbokning.
Kontanter	Alla utlägg ersätts via reseräkning. Det är viktigt att ange vilket konto och kostnadsställe som skall ta kostnaden. Det bästa är givetvis om vi kan styra våra inköp till företag som kan fakturera oss.
Kontorsmateriel	Ett litet standardsortiment av kontorsmaterial finns i kontorsförrådet. Hör av dig till Gun Flink om något behöver fyllas på eller beställas utöver standardsortimentet.
Kopieringsmaskinerna	Vi har en Sharp kopieringsmaskin. För service- och tonerbeställning ring 08-556 705 30. Vi beställer alltid hem 2 stycken toner. När du tar den sista ring och beställ 2 stycken. Njär toner kommer hem märk upp nr 2 med "beställ toner, 2 stycken".
Martin Olsson	BANQIT har två stycken kundkort hos Martin Olsson Storcash. Kundkorten får nyttjas BANQITanställda och finns hos Gun Flink.
Nätverksskrivarna	AGE fyller på förrådet med toner
Resebeställningar	Se Regler angående Resebeställning.
Reseräkningar	Gun Flink på Personalavdelningen är vår "Reseräkningskontroll". Fyll i blanketten RESERÄKNING. Gällande regler framgår av vårt Resereglemente. Ifyllda och attesterade reseräkningar skickas tillsammans med samtliga underlag (som Du stoppar i en tunn påse som finns i kontorsförrådet) till Gun Flink. Har Du frågor, kontakta Gun Flink, #4675.
Rikskuponger	Finns att hämta hos Gun Flink, Personalavdelningen, plan 1.
Städning	Sköts av Städsystem.

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Purchases

Hämta dokument med Google Chrome

Vid regelbundna köp från samma leverantör skall leverantören godkännas och eventuellt avtal upprättas. Detta görs av avdelningschef. Avtal undertecknas alltid av vår VD.

1. Våra inköp styrs av STO-0004 ”Inköp”.
2. Börja med att kontrollera leverantören mot DPL (Denied Parties List). Finns leverantören med på listan, välj annan leverantör.
3. Kontrollera om leverantören finns på vår lista för godkända leverantörer. Om inte så måste Checklista för godkännande av leverantörer av varor eller det för tjänster fyllas i och bifogas beställningen.
4. Vid inköp av inventarier över 5000 kr ska blanketten investeringsansökan fyllas i och godkännas.

Nu är förarbetet klart och beställningen kan utföras.

1. Boka ett beställningsnummer genom att skriva in ditt namn och ett datum bredvid ett ledigt nummer i listan längst ned denna sida. Lägg till fler nummer om de har tagit slut.
2. Skriv ut beställningsblanketten. Fyll i den. Underteckna den.
3. Skaffa attest på kopian
4. Beställ varan. Uppge ditt namn och vårt beställningsnummer och ange ”BANQIT AB, ”Fakturakontrollen”, Box 57, ... som faktureringsadress.
5. Den attesterade kopian skickas till Ekonomiavdelningen (postkorg ”Ekonomi Fakturor”) för kontroll mot faktura och arkivering.
6. När varan är levererad alternativ beställningen annullerad måste orderstatus ändras. Detta görs under "Ändra egna beställningar" och "Edit". Längst ner på beställningsblanketten finns en ruta för "Orderstatus".

Beställningsnummer:
203634
203633
203632
203631
203630
203629
203628, Roland Forsberg, 20111209

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Sales

Börje Martinsson
Manager

Göran Persson

Vi ansvarar för marknadsföring och försäljning av BANQITs självbetjäningsprodukter, med mycket stark fokusering på Q-Cash Router konceptet.
Detta koncept består av både hårdvara och mjukvara (Q-Connect).
I vår marknadsföring adresserar vi tre segment: Bank, Retail (shoppingcentra och stormarknader) samt CIT (Cash In Transit, dvs säkerhetstransportföretag).
Hemma i Sverige marknadsför vi QCR-en själva men i utlandet har vi valt ut ett antal "dörröppnare" (vi kallar de scouter) för att kunna presentera konceptet för rätt kunder i rätt segment.
Försäljningen sker direkt i Sverige och via partners i utlandet.

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Archive

The document archive is found here: Archive

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Subpages (1): Workflow

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Spares & Orders

Eftermarknad, Reservdelar, Orderkontor

Christina Brunnström Inköp, Orderkontor Reservdelar	**Eva Löfstedt** Inköp, Orderkontor Reservdelar	**Bo Sojé** Reservdelar

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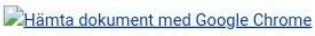
BANQIT Links:

- BANQIT External Web
- Vacation List
- Helpdesk
- Invoice Manager
- JIRA
- Reseräkningar NY
- WebTid
- MDRM 3.0



For info on how to use this wiki site, see How to use this wiki site

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IT

Instructions and manuals

- External File Sharing
- BANQIT FTP
- Visma Manual
- Webmail Hosted Exchange
-

Lösenordsbyte Hosted Exchange

Konfiguration Outlook Hosted Exchange

Länkar till webbsidor

Qnet - Qbranch webportal

Webmail - inloggning

Webmail - administration

Cedel domänregistrering - administration

.SE Direkt domänregistrering - administration

QPOL domänregistrering

Binero Webbhotell - administration

Subpages (3): BANQIT FTP External File Sharing Jira

Outlook konfiguration Hosted Exchange....	Kjell Kernen, Feb 21, 2012, 4:59 AM	v.1	
Visma Business 5.21.0.pdf (179k)	Kjell Kernen, Feb 21, 2012, 4:54 AM	v.1	
Webmail.doc (230k)	Kjell Kernen, Feb 21, 2012, 4:57 AM	v.1	

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Support

Mattias Schillén
Customer Support
Q-CashRouter

Göran Selin
Customer Support
Q-CashRouter

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Documentation

To create a new document you start by registering it and booking a document number here: Document Registration
Then you store the document in the document archive here: Document Archive

Subpages (2): Archive Registration

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BANQIT FTP

Om behov av filbyte via FTP finns kan Support hjälpa till att skapa katalog och kontouppgifter.
Kontakta Support (Kjell, Mattias eller Frans).

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Test

Manager:

Peer-Åke Eskelius	Bengt Hedin	Stefan De Maré	

Tools we use

JIRA portal
Tortoise/Subversion
Job Queue Viewer
Log Collector
PrintELJ (Swedbank)
SW log files

Routines and guidelines

Jira Users Guide
Test Routines
AutoRecoverDebugHalt
NoteID Configurations
QCCAMW.LOG_Statistics

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External File Sharing

Dela filer via www.banqit.se/files

- Öppna ftp.banqit.se med Windows Explorer (utforskaren) eller med ftp klient, Filezilla till exempel.
- Logga in:
- Anv: 139253_files
- Pass: BQfiles11

Lägg till filen du önskar dela ut i mappen som öppnas.
Den externa adressen för åtkomst till filen blir:
www.banqit.se/files/filnamn.filändelse

Viktigt!

- **T**änk på att filer som läggs på www.banqit.se/files kan komma att ses av andra än du själv tänkt. Filer som innehåller information som är sekretessbelagd eller som bör skyddas för allmän beskådan skall ej läggas här. Kontakta Support.
- www.banqit.se/files är inget permanent lagringsutrymme. För filer som skall vara tillgängliga externt permanent finns det andra lösningar. Kontakta Support.
- Support förbehåller sig rätten att tömma innehållet på www.banqit.se/files i slutet av varje månad.

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Web Edit Information

- Use Google Chrome (Other browsers might work , but Chrome is guarnteed to work).
- Click the small Edit button (A stylized picture of a pen) at the upper right of the page.
- Make your Edits
- Click Save on the top right (Spara in Swedish)

Formatting

Please, only use English in the Wiki
No fancy fonts and styles. Keep it simple, keep it clean.
Hint: copy-paste text from a document to notepad before copy-past to wiki, this will discard the formatting.

What is the purpose of the wiki?

Wikiwiki means quick in Hawaiian. A wiki site is a Web site in which users can easily edit any page. You are encouraged to add information to this site and especially correct any errors that you find in it.
A Wiki provides a low-maintenance way to record knowledge. Information that is usually traded in e-mail messages, gleaned from hallway conversations, or written on paper can instead be recorded in a wiki site. The idea is that we collectively build a an encyclopedia of knowledge as we go along.

Restoring a page

If you need to restore a previous version of a page, click History at the top of the page. You can then click on any of the dates to view the page as it existed on that date. When you find the version that you want to restore, click Restore this version on the toolbar.

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SW Development

Kjell Kernen Manager	Bengt Ekberg	Carl-Henrik Hjort	Esben Revenfeld	Frans Jansson
Kjell Jansson	Mikael Engqvist	Tomas Andersson	Curt Ohlund	

Tools

JIRA
Subversion
Visual Studio
Open Office Draw or
Libre Office Draw
Log files
AutoIT
Banqit CodeReviewClient

Routines and guidelines
JIRA instruction

Build instructions

Development Process
Retrospective
Release Handling
Coding standard/Best practice
Code review
Weekly Group Meetings

Information about QCR components
- MDRMController
- QCRU3 Network Layout

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BANQ IT

LOG IN TO BANQIT EXTRANET

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Q-CashRouter: An Innovative Technology for Local Cash Recycling

BANQIT's Q-Cash Router provides fast, secure and convenient cash services for retailers, banks and CIT-companies.

- The Q-CashRouter reduces cash handling costs by re-circulating banknotes at the point of deposit
- The Q-CashRouter can be used by up to four users simultaneously
- An integrity booth surrounding the deposit unit provides increased safety for depositing customers
- The Q-CashRouter provides secure packaging of excess banknotes in SealPacks which can be used to refill other ATM's
- The Q-CashRouter reduces cash transports and processing of banknotes resulting in increased security and less impact on the environment

> Read more

Innovative cash handling solutions

BANQIT WORLDWIDE

NEWS

[Sep 25, 2012] Successful integration: BANQIT presents cash recycling system with innovative banknote storage concept from Wincor Nixdorf

—

[Jan 10, 2012] BANQIT AB integrates intelligent cassette technology from Wincor Nixdorf

—

[Jan 10, 2012] BANQIT AB integrerar intelligent kassetteknologi från Wincor Nixdorf

Solutions for Banks

Improve customer satisfaction with self-service solutions
> Read more

Solutions for CITs

Reduce security risks with fewer cash transports
> Read more

Solutions for Retailers

Boost operational efficiency and cut costs
> Read more

BANQ IT

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Q-CashRouter
Advanced cash recycling system

The Q–CashRouter is the first cash recycling system of its kind to handle simultaneous deposits, withdrawals and exchange from multiple fascias.

It is ideal for volume recycling. Depositing customers can enjoy the safety provided by the integrity booth and simultaneously withdrawing customers are offered fast service at the side units. A combination that is fundamental for making volume recycling a success.

The Q-CashRouter authenticates, counts, sorts and accounts for deposited banknotes. Any surplus, suspect or unfit banknotes are taken out of circulation and stored in tamper-proof SealPack plastic enclosures for secure transport. The system then re-circulates cash directly at the point of deposit.

This innovative solution vastly improves your cash handling at a fraction of the cost of traditional cash handling services.

Download concept sheet: Q–CashRouter

Download product sheet: Q–CashRouter

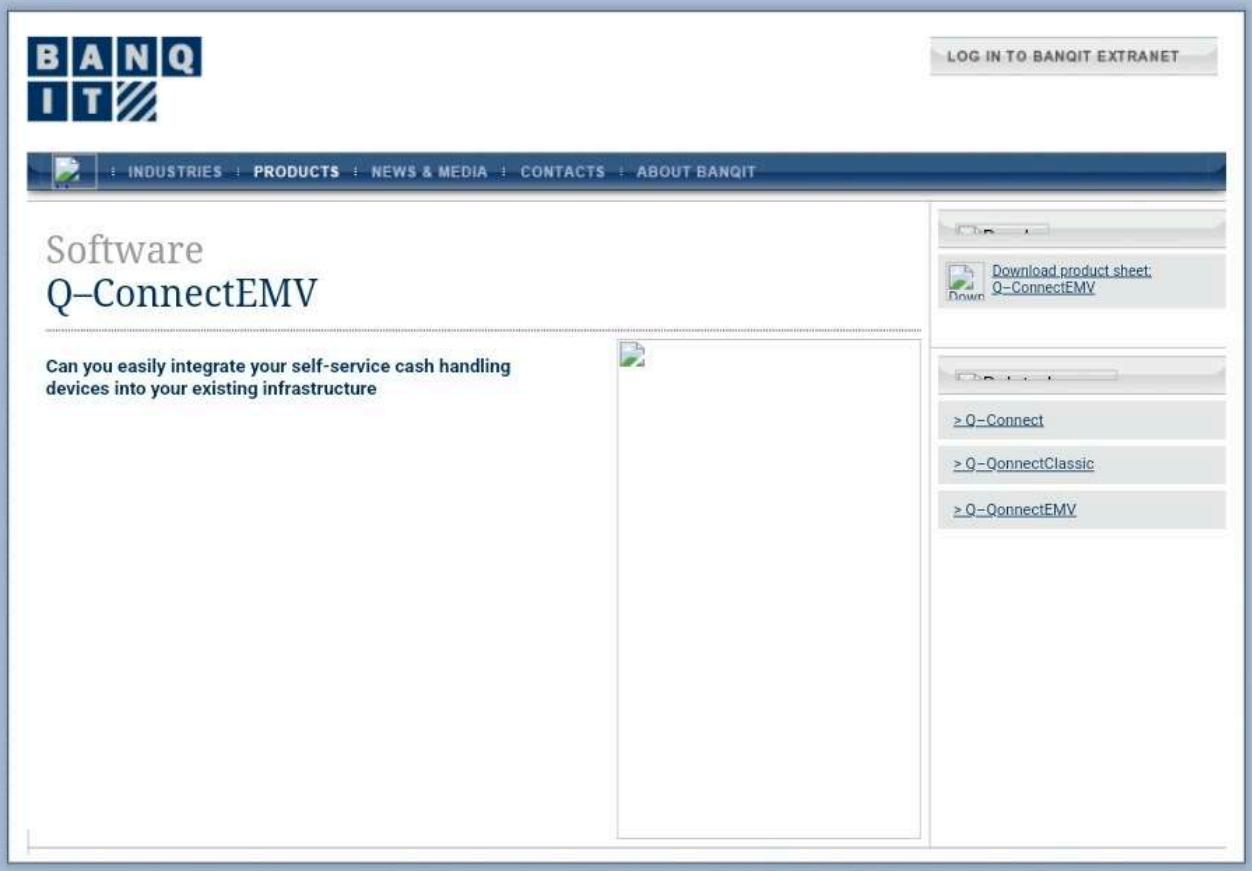
Download: Q–CashRouter in shopping mall

Download report: Summary of Swedbank's evaluation report of the Q–CashRouter

> Q–Connect

> Q-ConnectClassic

> Q-ConnectEMV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BANQIT's family of software products

Q-Connect is the collective name for BANQIT's family of software products designed to support all BANQIT cash handing solutions. Based on many decades of experiences, the software offers easy integration of ATM's and Q-CashRouter into existing network infrastructures. Built on Microsoft and CEN/XFS platforms, Q-Connect supports open standards and transaction protocols like NDC+ and DDC.
Integration into proprietary networks is supported by protocoll conversion tools.

The Q-Connect family comprises the following software products:

- *Q-ConnectClassic:* A software emulation package for intgration into NDC+ and DDC standard transaction environments.
- *Q-ConnectAdmin:* A management package for the administration and support of the QCashRouter.
- *Q-ConnectXFS:* A platform for multivendor software

BANQ IT

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Software
Q–ConnectClassic

Compact freestanding cash dispenser for indoor use

Q-ConnectClassic is a turn-key software solution for BANQT's Self Service Products. Based on globally used transaction protocols in connects to most network switch products. Based on many decades of experiences, the software offers easy integration of ATM's and Q-CashRouter into existing network infrastructures. Built on Microsoft and CEN/XFS platforms, Q-ConnectClassic supports open standards and transaction protocols like NDC and DDC. Integration into proprietary networks is supported by protocol conversion tools.

A Menu driven operator interface makes the "feed-and-care" procedures fast and easy to handle so staff with little or no technical expertise can handle replenishments.

Q-ConnectClassic provides connection to external WEB servers and downloads pages that are shown on the screen by Microsoft Internet Explorer.

Download product sheet: Q–ConnectClassic

> Q–Connect

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> Q–QonnectEMV

Presentation on theme: "Www.banqit.com The Ultimate Solution for Cash Handling."— Presentation transcript:

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1 www.banqit.com The Ultimate Solution for Cash Handling

2 www.banqit.com Bank Notes in Circulation January 1996 – January 2004

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5 www.banqit.com COUNTING ATM HEAD CASHIER OR CASHIER Cashier NOTE DELIVERY TO BANK AND EXCHANGE / LOW VALUE NOTES TO STORES IN DISPOSABLE CASSETTES NOTES FOR DESTRUCTION COUNTING CENTRAL BANK POST NATIONAL BANK BANK / DEPOT / POST NIGHT DEPOSIT OR CASHIER QUALITY SORTED INTO TWO LEVELS NATIONAL BANK QUALITY (6 SEK/100 Notes) ATM QUALITY (10 SEK/100 Notes) CASH FLOW TODAY: Manual NOTE COUNTING everywhere COUNTING Cashier Counting COUNTING 98-05-27 BANK / POST The cost for cash handling in Sweden today, appr. EUR 1.2 billion/year. Corresponding amount in the U.K., appr. EUR 5.5 billion/year.

6 www.banqit.com SHORTCIRCUITSHORTCIRCUIT Head cashier Or cashier Cashier DISPOSABLE CASSETTES NOTES FOR DESTRUCTION NATIONAL BANK BANK / DEPOT / POST Internet Cash flow Control CASH FLOW TOMORROW: No manual NOTE COUNTING Counting Cashier Counting Recycling Low quality UNDERFLOW / OVERFLOW IN DISPOSABLE CASSETTES EXCHANGE / LOW VALUE NOTES IN DISPOSABLE CASSETTES NOTES FOR DESTRUCTION IN DISPOSABLE CASSETTES Low quality Recycling NEW DEPOSIT/DISPENSE MACHINE Automatic ATM loading by customer Deposit receipt for customer Quality sorting of notes Overflow > Disposable cassettes Low quality notes > Disposable cassettes Suspect counterfeit > Disposable cassette 98-04-27 Estimated cost reduction after installation of QCR in Sweden, appr. EUR 0.3-0.4 billion. Corresponding amount in the U.K. is appr. EUR 2.1 billion. Technical service

7 www.banqit.com

8 Local Circulation Deposits Withdrawals Deposits/Withdrawals

9 www.banqit.com Branch staff dispenses and deposits Q-CashRouter Local Recycling QCR productivity with one deposit and two dispense fascias One deposit of 400 notes (3 minutes) Dispenses to 6 customers 5 notes each Q-CashRouter Dispenses to 6 customers 5 notes each Processes 12 customer Withdrawals during the same time as 1 customer makes a Deposit

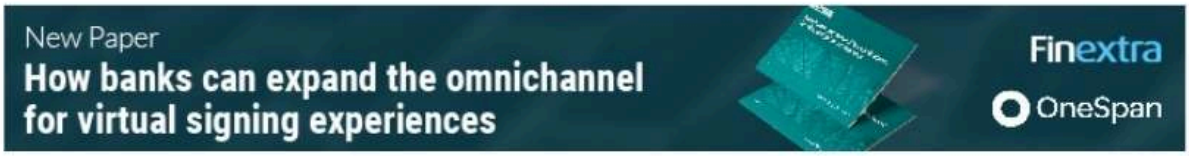
10 www.banqit.com

11 SealPack™ - Automatic Bundling of notes Quality sorted Notes Suspected and Ink-died Notes Counterfeit Notes Poor quality Notes

12 www.banqit.com New Innovative Business Concepts Q-CashRouter Replaces: ATMs Deposit machines Night Deposit Safes Manual processing of daily takings Locations: Bank Branches Supermarkets/Hypermarkets Shopping Malls Partnering: Banks Shops CITs Real estate owner

13 www.banqit.com Q-CashRouter - Main Benefits Local Recycling of notes with a significant cost reduction Replaces up to 2 ATMs, single note, bundle and envelope deposit systems and Night Deposit Boxes Immediate crediting of depositor's bank account New Revenues for Banks: Change from a cost driven to a revenue driven cash handling Business –Revenues from Deposit services (fewer CIT transports and no costs for central sorting, counting, etc.) –Sales of exchange cash SealPacks to Retailers –Sales of SealPacks for ATM-loading

14 www.banqit.com BANQIT's Future BANQIT will become number one in the world in cash handling Our concept and our products for local recycling will reduce the volume of bank notes, and the costs for cash handling, by up to 50% BANQIT's concepts and products are protected by an extensive and worldwide patent portfolio BANQIT needs a resourceful partner with extensive market coverage in the banking and retail sector in countries where the company does not have a presence today Why and how did BANQIT develop these concepts, and the technology?



Finextra

SEB signs with Banqit for ATM units

20 February 2003 0 0 0

Swedish banking group SEB has contracted with local financial technology vendor Banqit for the supply of ATM units through to 2004.

The initial order is for 34 of the vendor's Q-CashExterior 25 units to replace the bank's older machines in Stockholm and Gothenburg.

The units will use CEN6 safes and a Microsfot Windows/NT-based application developed by the bank. Banqit's application software Q-ConnectXFS will manage interfaces and devices.

Installation and maintenance support will be handled by Siemens Business Service, Sweden and deployment of the units will begin mid-2003.

SEB purchased 1000 licenses for Banquit's Q-Trans ATM software in December 2002 and is rolling the system out in the first half of this year.

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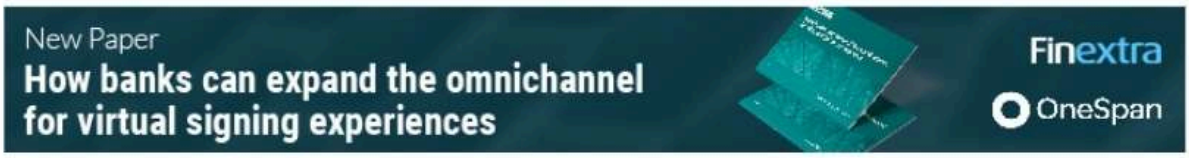

Banqit chooses Wincor Nixdorf Cineo banknote storage technology

10 January 2012 0 0 0

Source: Wincor Nixdorf

Cash solution provider Banqit AB will in the future use the Cineo banknote storage technology from Wincor Nixdorf in its Q-CashRouter, as a complement to its own cash recycling technology.

A strategic co-operation agreement has been signed by the two companies. This makes the Swedish company the second alongside Giesecke & Devrient to use the intelligent cassettes and the Cash Cycle Management Solution concept from Wincor Nixdorf.

"The use of Wincor Nixdorf´s cassette technology by another vendor marks a further milestone on the way to standardizing banknote storage solutions," said Mr. Hans-Gunther Voss, Vice President of Research and Development at Wincor Nixdorf. Cassettes from Wincor Nixdorf´s CINEO system generation can already be exchanged between ATMs, cash recycling systems, automated teller safes and retail systems. For example, the full cassettes from automated teller safes where deposited transactions dominate can be used in automated teller machines without the need for intermediate processing. The integration of these cassette technology in a processing system for cash centers has been presented by technology provider Giesecke & Devrient in January 2011.

"Wincor Nixdorf´s intelligent CINEO cassette technology integrated in the Q-CashRouter, with its four customer fascias for simultaneous multiple transactions at high-volume locations, offers banks key benefits such as lower cash handling costs, improved processes and better security," commented Mr. Leif Lundblad, CEO and founder of BANQIT AB. Mr. Lundblad is an industry innovator who has invented many of the cash dispensing technologies used in automated teller safes and ATMs.

"BANQIT´s decision to use the CINEO cassette technology is yet another step toward the standardization required by banks as well as central banks. Standardization is an important prerequisite for cutting costs and optimizing processes across the entire cash supply chain," explained Mr. Hans-Gunther Voss at Wincor Nixdorf.

The Q-CashRouter from BANQIT is a unique "high-end" cash recycler solution for locations with a high volume of banknotes. It has four customer fascias combined in one solution,all of which can be processed simultaneously. Other unique features are the SealPack and ink dye note detection technology.

CINEO is the new system generation from Wincor Nixdorf comprising cash recycling systems, ATMs, automated teller safes and transaction terminals, and is part of the revolutionary Cash Cycle Management Solutions portfolio. CINEO sets new standards in performance, security, serviceability and optimized cash processes due to the intelligent end-to-end cassettes that enables cash transfer between different cash points.

News

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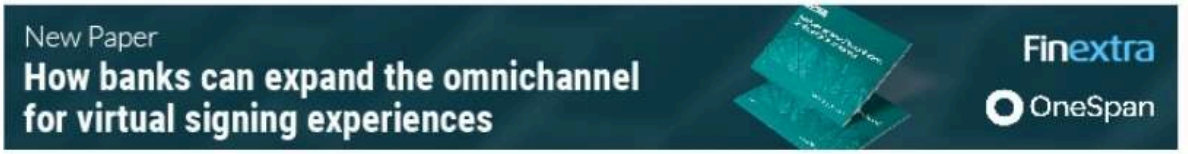

EDB buys BanqIT Business Applications for NKr50m

12 May 2005 0 0 0

Nordic IT services group EDB Business Partner has signed an agreement to acquire BanqIT Business Applications, a Swedish provider of branch automation technology, for NKr50 million in cash.

EDB has bought the business from BanqIT AB, which also supplies ATMs and cash processing technology.

The BanqIT Business Applications unit is expected to generate operating revenue of around NKr35 million in 2005. Following the acquisition, the unit's 30 staff will all become employees of EDB.

EDB says the acquisition will give it a stronger position in the Swedish market and strengthen its portfolio of branch banking products.

The acquisition will be completed immediately with a cash payment.

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27/12-10 - Press releases

New 'Super ATMs' Can Halve Cash in Circulation

Real market results from a major Swedish bank show that BANQIT's new revolutionary local cash recycling machine, the QCR, leads to highly satisfied customers and massive savings in notes in circulation and corresponding costs for cash handling. The QCR is a Â'super ATM' that receives deposits from retailers and within a few seconds dispenses the same notes to bank customers, in effect shortcircuiting the traditional extensive and expensive cash handling loop.

Results from a real life proof-of-concept installation of a Q-Cash Router (QCR) lasting 12 months at Swedbank's headquarter in central Stockholm, Sweden, have just been compiled and analyzed. The results show that Swedbank (one of Sweden's four major banks with 19 000 employees and assets totalling EUR 196 billion) was able to reduce the need for transports of notes to and from the branch by EUR 490,000 worth of notes per week, equivalent to EUR 25 million worth of notes per year, by using only one single QCR machine.

A survey also shows that Swedbank's retail customers using the new QCR were highly satisfied with the functionality of the QCR; It was regarded as user friendly, reliable, informative, and with a good capacity to deposit cash swiftly and to receive cash without queues.

Â"The results indicate that it is possible to reduce the amount of cash being unnecessarily transported and counted by banks, CIT companies and cash depots by up to 50 per cent, in Sweden or in any other country in the world", said Leif Lundblad, CEO and owner of BANQIT, the developer and manufacturer of QCR.

Massive potential savings of cash handling costs around the world

The total cost of handling cash is estimated at SEK 11 billion (EUR 1.2 billion) annually in Sweden, at EUR 50-70 billion per year in the European Union, and at USD 60 billion per year in the USA. The costs correspond to 0.4-0.6 per cent of annual GDP's, of which a very large portion could be saved by using local recycling machines such as the QCR. The main costs are the actual manual handling of cash, transport of cash between shops, banks and cash depots, and the risks for robberies.

Â"Today's ATMs are ancient machines that should be replaced. It is almost bizarre to transport and count all the cash that is deposited so many times in the loop when the customers could withdraw the same cash in the same machine just a few meters away, and just a few seconds later. Cash handling amounts to up to 10-20 per cent of an average retail bank's total costs, so there are massive savings to be done for both banks and the society at large", said Leif Lundblad.

Despite strong efforts by banks and card companies to entice people to use cards instead of cash, people still prefer cash for many reasons, and the fact is that cash in circulation is increasing globally, not decreasing.

That can only change by Â"shortcircuiting" the unnecessary and expensive cash handling loop and use modern cash recycling machines like the QCR that can both accept and immediately dispense cash without the need for the cash to be transported to cash depots and central banks for counting etc.

Mr. Leif Lundblad – the serial cash handling solutions entrepreneur

Leif Lundblad is a serial entrepreneur and the man who in the 70's invented cash dispensing technologies that are now used in ATM's and teller-assisted units all over the world. The QCR is the result of ten years of inventions and product development and is protected by more than 90 patents.

Cash deposited by retailers in the QCR is credited to their accounts immediately. All the notes are automatically counted, sorted and controllled. Counterfeit detected, unfit, dyed and suspect notes are separated and retained. The QCR can through its unique design with multiple interfaces (so-called fascias) simultaneously process up to 10 withdrawals and one deposit in four minutes. The QCR is the only cash recycling machine on the market that can simultaneously service three people with deposit and withdrawals.

Another unique and patented feature of the QCR is the use of SealPacks: heat-sealed, tamper-proof plastic enclosures with the content labelled in clear text and barcoded. This eliminates the time and costs associated with transporting banknotes to cash centres for processing and then back to ATMs via standard cash cassettes.

The QCR differentiates itself from other traditional ATMs and recycling machines (which only have one customer fascia) by having four customer fascias which can be operated simultaneously for deposits and withdrawals. This makes the QCR the only solution available in the market enabling real efficient local recycling of cash with a possible 50 per cent reduction of the costs for manual cash handling and transportation of cash.

Central banks all over the world have lately been trying to push commercial banks to take responsability for reducing cash in circulation due to the high costs and risks associated with cash handling, and are in general in favour of cash recycling solutions.

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About BANQIT

BANQIT develops, manufactures and market solutions for cash handling, including local cash recycling. BANQIT offers innovative systems based on advanced technology to retail banks, cash-in-transit companies (CITs) and retailers.

The Q-CashRouter (QCR) - BANQIT´s new product line, enables automated and efficient local recycling of cash and reduces the need for manual handling and transporting of cash, with considerable cost savings for retail banks, retailers and CIT companies. It is a self service unit allowing banknotes that are deposited in the QCR to be reused immediately for withdrawals, including automated counting, sorting, quality control, counterfeit and ink-dye detection as well as automated banknote packaging in SealPacks.

Fewer transports will reduce costs in society, increase security and benefit the environment.

Mr. Leif Lundblad is the inventor of the Q-CashRouter and the owner of BANQIT. Mr. Lundblad has invented many of the modern cash dispensing technologies used in TAUs and ATMs. BANQIT's present operations started in 1999. BANQIT is based in Kista just north of Stockholm, Sweden. Leif Lundblad is BANQIT's CEO.

Press contacts

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New Innovative Business Concepts Q-CashRouter Replaces: ATMs Deposit machines Night Deposit Safes Manual processing of daily takings Locations: Bank Branches Supermarkets/Hypermarkets Shopping Malls Partnering: Banks Shops CITs Real estate owner

Q-CashRouter - Main Benefits Local Recycling of notes with a significant cost reduction Replaces up to 2 ATMs, single note, bundle and envelope deposit systems and Night Deposit Boxes Immediate crediting of depositor's bank account New Revenues for Banks: Change from a cost driven to a revenue driven cash handling Business –Revenues from Deposit services (fewer CIT transports and no costs for central sorting, counting, etc.) –Sales of exchange cash SealPacks to Retailers –Sales of SealPacks for ATM-loading

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Presentation transcript:

The Ultimate Solution for Cash Handling

Bank Notes in Circulation January 1996 – January 2004

Cash is Costly Cost in EU (source: Euopean payment Council) –No less than EUR 50 billion (0,4 – 0,6% of GDP) –360 billion Cash Transactions –60 billion Non-cash transactions Cost Split –Bank 50%, retailers 40%, others 10% Cost for banks –About 20% of annual operating costs Estimated Cost in United States –USD 60 billion

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TECHNOLOGY | October 27, 2009

Swedbank Launches Cash Recycling Machine

To reduce cost for cash handling and increase security

By CBR Staff Writer

Swedbank has launched Q-CashRouter (QCR), a new cash recycling machine, designed to reduce cost for cash handling and to increase security.

Combined with two side units for cash withdrawal, QCR enables the store owner to deposit the daily amount and to receive a confirmation of an immediate credit to the bank account. This happens simultaneously as other customers make cash withdrawals from the side units. The bank said that the QCR-machine has been developed by BANQIT, a Sweden company within the cash handling field.

Kjell Hedman, head of Swedish banking at Swedbank, said: As the handling of cash is costly and affects both the environment and the safety at our offices, we work actively with different types of solutions. We are convinced that this venture will make the days of our customers and employees a little easier.

Leif Lundblad, CEO of BANQIT, said: With QCR-machines the volume and cost for cash handling can be reduced with up to 50%, as the cash is recycled locally several times in. This does not only lower the risk for robbery of transports but also the risk for robbery at bank branch offices.

COUNTING BANK / POST The cost for cash handling in Sweden today, appr. EUR 1.2 billion/year. Corresponding amount in the U.K., appr. EUR 5.5 billion/year.

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Branch staff dispenses and deposits Q-CashRouter Local Recycling QCR productivity with one deposit and two dispense fascias One deposit of 400 notes (3 minutes) Dispenses to 6 customers 5 notes each Q-CashRouter Dispenses to 6 customers 5 notes each Processes 12 customer Withdrawals during the same time as 1 customer makes a Deposit

SealPack™ - Automatic Bundling of notes Quality sorted Notes Suspected and Ink-died Notes Counterfeit Notes Poor quality Notes

Superentreprenören Leif Lundblad har lämnat Industrifondens styrelse efter 13 år för att fokusera på sitt nya företag, BANQIT, som utvecklat en helt ny typ av dubbelbankomat, som sköter både insättning och uttag av sedlar. Han vill upprepa succén med InterInnovation, hans förra bolag som utvecklade bankomaten. Det växte fram till en omsättning på 1,2 miljarder kr på tio år.
– Jag vet att det är omöjligt, men jag har en dröm och den är på väg att förverkligas, säger han.

Kronan på verket för Leif Lundblad

En av Industrifondens mest långvariga styrelseledamöter, Leif Lundblad, avböjde omval och avgick i somras efter 13 år i styrelsen. Tiden räcker helt enkelt inte längre till för denne serieentreprenör, som nu, vid 67 års ålder, är i full färd med att etablera sitt senaste företag BANQIT på marknaden. Produkten – ett helt nytt system för kontanthantering – ska nu lanseras i stor skala.

Leif Lundblad är både entreprenör och innovatör med bankomaten, sedelräknaren och seal-faxen (en fax där dokumenten levereras vikta och inplastade, som aldrig slog på marknaden då e-mailen snabbt tog över) på meritlistan. Den nya produkten, dubbelbankomaten Q-Cash/routern (QCR), innehåller delar från alla de tidigare projekten. Kronan på verket i Leif Lundblads innovatörsbana, således.

– Vi lanserar det första exemplaret i Borlänge i december, berättar en entusiastisk Leif Lundblad. Och vi ligger helt rätt i tiden med tanke på alla värdetransportrån. Med QCR:en minskar behovet av att transportera kontanter med hälften.

KOLL PÅ FALSKA SEDLAR

Dubbelbankomaten är alltså både en insättnings- och uttagsautomat. Dessutom sorterar den pengarna, räknar dem och har till och med koll på falska sedlar. Den som försöker sätta in en falsk sedel fotograferas av automaten och fotot och den falska sedeln inpackad i ett Sealpack lämnas över till polisen.

– Kontanthanteringen kostar idag 11 miljarder kr om året – och det bara i Sverige, säger Leif Lundblad. Det är ett fruktansvärt slöseri, vilket beror på att en sedel som hamnar i en ICA-kassa måste passera 11 olika anhalter innan den kan tas ut i bankomaten igen.

Den nya dubbelbankomaten är tänkt att finnas i köpcentra och stormarknader och där kan kunderna ta ut pengar och handla för dem. Sedan sätter handlaren in dem igen i samma automat. På så sätt finns det alltid pengar i bankomaten och man slipper alla transporter, all räkning och all sortering. Det sköter maskinen om. Och skulle maskinen få in för mycket pengar räknas de, buntas ihop och plastas in. Där har Leif Lundblad använt samma teknik som i Seal-faxen.

– Vi har hållit på i fem år med utvecklingen, för detta är en komplicerad maskin, säger Leif Lundblad. Men nu är det dags för lansering. Vi satsar stort på marknadsföring mot bankerna, som ska ta över ansvaret för kontanthanteringen i Sverige från Riksbanken.

Först ut i Sverige blir köpcen-

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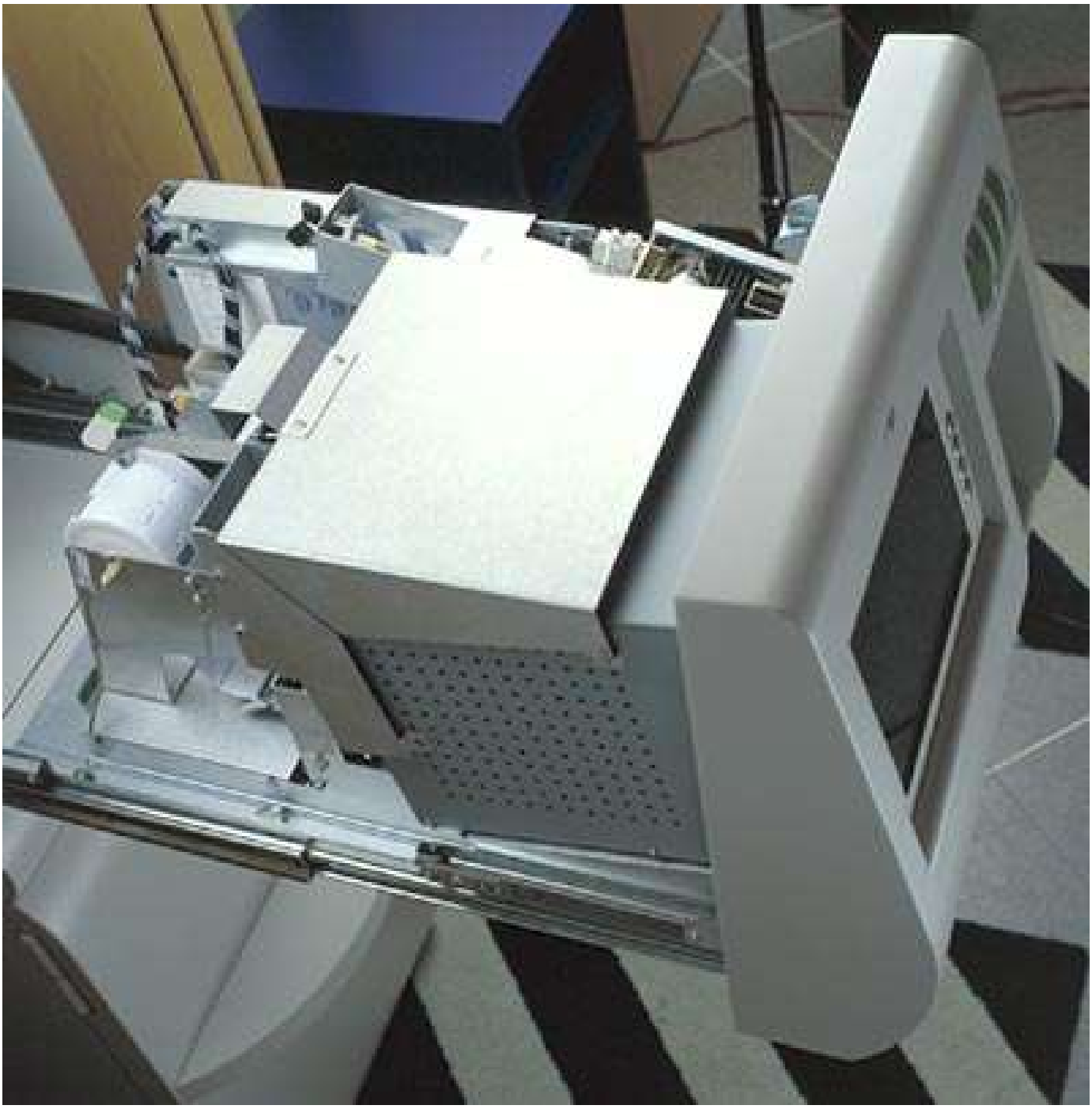

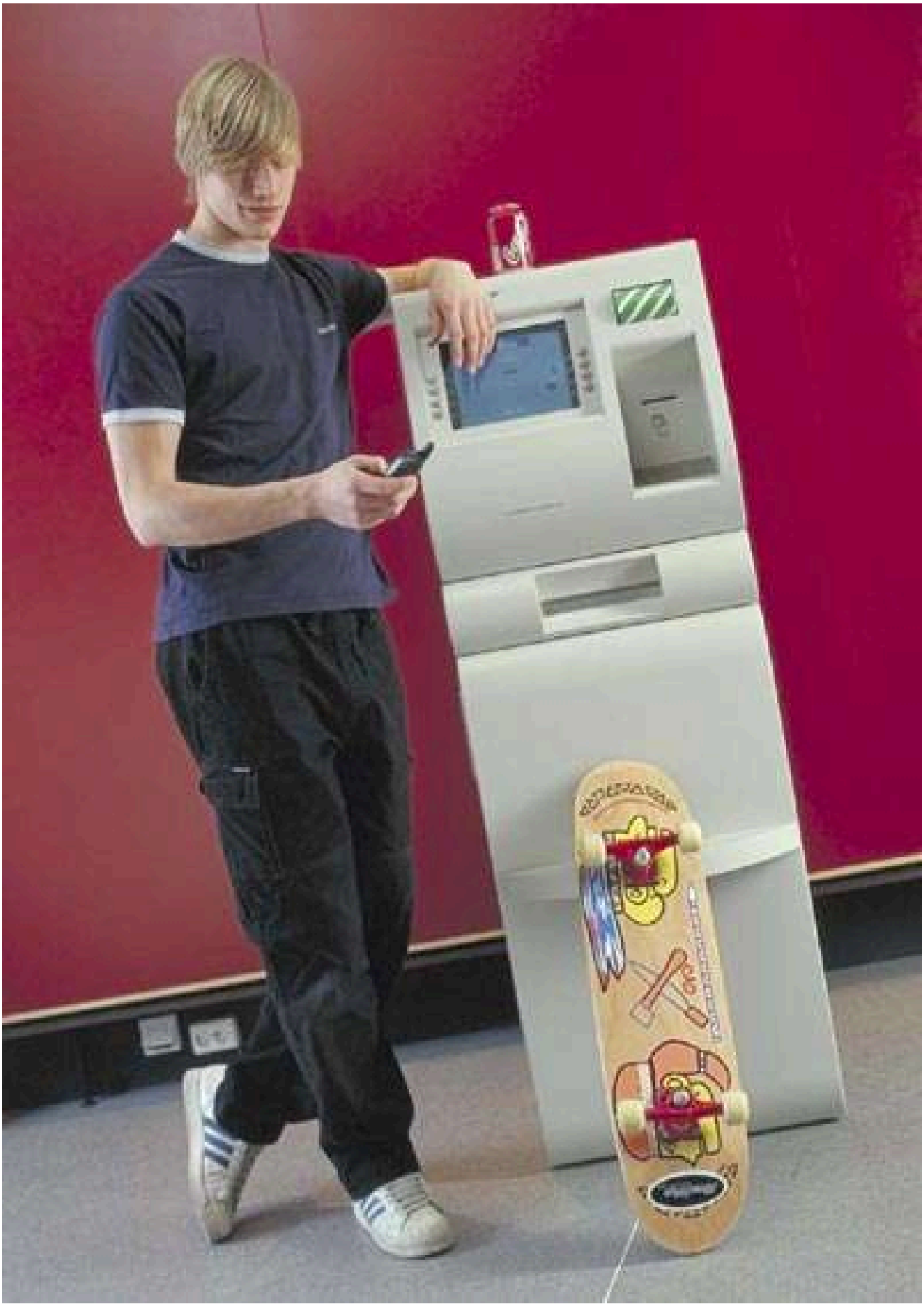

NEWS

BANQIT to use Wincor Nixdorf's CINEO cassette storage technology

Jan. 9, 2012

Cash solution provider BANQIT AB has signed a strategic agreement with Wincor Nixdorf to use Wincor's CINEO banknote storage technology for its Q-CashRouter. The Q-CashRouter from BANQIT is a cash recycler solution for locations with a high volume of banknotes.

According to a company press release, BANQIT is implementing the technology to complement its own cash recycling technology.

"Wincor Nixdorf´s intelligent CINEO cassette technology integrated in the Q-CashRouter, with its four customer fascias for simultaneous multiple transactions at high-volume locations, offers banks key benefits such as lower cash handling costs, improved processes and better security," said Leif Lundblad, CEO and founder of BANQIT AB.

CINEO is the new system generation from Wincor Nixdorf comprising cash recycling systems, ATMs, automated teller safes and transaction terminals, and is part of its Cash Cycle Management Solutions portfolio.

For more information on this topic, visit our cash management research center.

Manufacturers Vault Cash / Cash Management Wincor Nixdorf International

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Insights on the ATM Global Market to 2027 - Featuring BankUnited, Banqit and Cashway Technology Among Others - ResearchAndMarkets.com

December 06, 2021 01:15 PM Eastern Standard Time

DUBLIN--(BUSINESS WIRE)--The "Automated Teller Machines (ATMs) - Global Market Trajectory & Analytics" report has been added to **ResearchAndMarkets.com's** offering.

Amid the COVID-19 crisis, the global market for Automated Teller Machines (ATMs) estimated at US$19.5 Billion in the year 2020, is projected to reach a revised size of US$29 Billion by 2027, growing at a CAGR of 5.8% over the period 2020-2027.

15 & Below, one of the segments analyzed in the report, is projected to record 5.6% CAGR and reach US$20 Billion by the end of the analysis period. After an early analysis of the business implications of the pandemic and its induced economic crisis, growth in the Above 15 segment is readjusted to a revised 6.4% CAGR for the next 7-year period.

The U.S. Market is Estimated at $5.3 Billion, While China is Forecast to Grow at 8.8% CAGR

The Automated Teller Machines (ATMs) market in the U.S. is estimated at US$5.3 Billion in the year 2020. China, the world's second largest economy, is forecast to reach a projected market size of US$6.1 Billion by the year 2027 trailing a CAGR of 8.8% over the analysis period 2020 to 2027.

Among the other noteworthy geographic markets are Japan and Canada, each forecast to grow at 3.2% and 5.2% respectively over the 2020-2027 period. Within Europe, Germany is forecast to grow at approximately 3.7% CAGR.

Select Competitors (Total 26 Featured):

- Automatia Pankkiautomaatit Oy
- Banking Automation Ltd.
- BankUnited
- Banqit AB
- Cashway Technology Co., Ltd.
- Chungho Comnet Co., Ltd.
- Diebold Nixdorf, Inc.
- Eastcom Co., Ltd.

- Euronet Worldwide, Inc.
- First Merit Bank

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For more information about this report visit https://www.researchandmarkets.com/r/v0jgv.

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Pressmeddelande (First North: WINT)

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BANQIT lägger order om 1,3 MSEK hos West International

West International har erhållit en order från BANQIT Self Service Products AB på skrivarsystem för bankomater. Affären är en del i ett pågående leveransprojekt till slutkund. Ordervärdet uppgår till knappt 1,3 MSEK.

För ytterligare information kontakta:

Sten Karlsson, VD West International AB
Mobil: 070-555 6065

Om West International AB (publ):

West International levererar smarta transaktions- och betalningslösningar inom butik, hotell och restaurang, samt retail banking. Bland företagets erbjudanden finns kassasystem, kontanthanteringslösningar, självbetjäningskiosker och andra produkter som alla syftar till att effektivisera våra kunders betalningsflöden för sina konsumenter. Försäljning sker dels via systemintegratörer och distributörer, men också direkt till slutkund. Bland kunder och användare återfinns exempelvis Schenker, EG Gruppen, Fujitsu, HP, Volvo, H&M, McDonald's, Citibank och Absa Bank. Bolaget har säte i Stockholm och är listat på Nasdaq OMX First North. Bolagets Certified Adviser är Thenberg & Kinde Fondkommission AB, 031-7455000. Se även www.westint.se

Press release Box-ID: 541608

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09/25/2012

Successful integration: BANQIT presents cash recycling system with innovative banknote storage concept from Wincor Nixdorf

(PresseBox) (Paderborn, 09/25/2012) At Wincor World 2012 (Rheda-Wiedenbrück, September 16 to 18, 2012), BANQIT AB, a provider of cash handling solutions, is presenting the company's first cash recycling system, the Q-CashRouter, with integrated banknote storage technology from Wincor Nixdorf. That makes BANQIT the second provider to be presenting the use of intelligent cassettes from Wincor Nixdorf in its systems. In 2011, the Munich-based technology group Giesecke und Devrient had already presented a processing system that processes CINEO cassettes. BANQIT AB and Wincor Nixdorf signed a cooperation agreement just at the start of 2012 that allows the Swedish company to adapt Wincor Nixdorf's Cash Cycle Management Solutions concept.

The advantage of the Cash Cycle Management Solutions concept is that the cash cassettes in Wincor Nixdorf's CINEO system generation can be exchanged between ATMs, cash recycling systems and automated teller safes. "Integrating the intelligent CINEO cassette technology from Wincor Nixdorf into the Q-CashRouter provides banks with decisive benefits such as lower cash handling costs, improved processes and greater security," said Leif Lundblad, CEO and founder of BANQIT AB.

"The successful cooperation with BANQIT shows that, together with another manufacturer, we have come a huge step closer to fulfilling the demand for standardization from the banks and central banks and hence paved the way for process optimizations in cash handling," explains Uwe Krause, Vice President Banking at Wincor Nixdorf.

CINEO is the innovative system generation from Wincor Nixdorf. It comprises ATMs, cash recycling systems, automated teller safes and transaction terminals. It is part of Wincor Nixdorf's Cash Cycle Management Solution concept. CINEO systems set standards in terms of processing speed, security and serviceability.

About BANQIT:

BANQIT develops, manufactures and markets self-service equipment including "high-end" cash recirculation solutions to retail banks, retailers and CiT companies. BANQIT is based in Kista, Sweden. Mr. Leif Lundblad is the owner and CEO of the company (www.banqit.com).

This document contains forward-looking statements that are based on current estimates and assumptions made by the management of Wincor Nixdorf AG to the best of its knowledge. Such forward-looking statements are subject to risks and uncertainties, the non-occurrence or occurrence of which could cause the actual results - including the financial condition and profitability of Wincor Nixdorf - to differ materially from or be more negative than those expressed or implied by such forward-looking statements. This also applies to the forward-looking estimates and forecasts derived from third-party studies. Consequently, neither the Company nor its management can give any assurance regarding the future accuracy of the opinions set forth in this document or the actual occurrence of the predicted developments.

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Cash circulation volumes continue to grow across the globe. According to various studies conducted by some of the worldâ€™s leading central banks and payments councils, around 90% of all payment transactions worldwide are made in cash.

But the cost of handling cash is high, especially where long-established conventional methods involving manual work and transportation between cash centres, retailers, banks and consumers have not been brought up to date with state-of- the-art systems.

A new concept has now been introduced by the Swedish-based ATM designer and manufacturer BANQIT. The *Q-Cash Router* is a novel cash recycling system that will handle deposits, withdrawals and exchange simultaneously from multiple access points. Notes are effectively recirculated in one system â€“ as retailers deposit their daily takings, bank customers can make withdrawals in parallel.

The Q-Cash Router can be equipped with four ATM fascias. The central access point is a cash recycling fascia that enables retailers to deposit bundles of up to 400 notes of mixed denominations, as well as to withdraw cash exactly like an ATM. Two side access points serve as conventional ATMs providing withdrawal functions. But instead of withdrawing cash from ATM cassettes, these fascias use cash which is drawn from the central recycling module. The fourth fascia is located to the rear of the main unit and provides an option for a duplicate â€˜utilityâ€™, typically used by bank or retail staff to process cash deposits or till surpluses and to obtain cash.

Any cash recycled and reissued through the Q-Cash Router is authenticated and tested for fitness according to local regulations. The system, for example, fully complies with Article 6 of the Council of the European Union Regulation No. 1338/2001 for recirculation of euro banknotes, and the ECB decision on the authenticity and fitness checking and recirculation of the euro banknotes.

The Q-Cash Router retains suspect notes in clear plastic *SealPacksâ„¢* which link the notes back to the depositor.Â The same type of plastic pack is also used to package notes which are unfit or surplus to requirements.Â The number of unfit or surplus notes placed into each SealPack is user-defined to enable efficient back office or central banknote processing and reconciliation.

The Q-Cash Router is particularly suited for installation in environments where large volumes of cash are processed and circulated every day, such as supermarkets, shopping malls and large bank branch offices, and where the amounts being deposited and withdrawn are roughly in balance. In all cases, deposits can be made daily and credited to customers accounts (and, in the case of â€˜privateâ€™ systems in supermarkets, reconciled to POS terminals), the deposits then being used not only for cash withdrawals but also to replenish tills or even sold to CIT companies for replenishment of other ATMs.

The system has been successfully running at one of Swedbankâ€™s branches in Stockholm since 2009. Together with Swedbank, BANQIT has conducted research involving 41 business customers that have deposited their daily cash takings in the system while consumers have used it for withdrawals. On average, around 360 deposits and 8,000 withdrawals have been processed each month. Deposits amounted to nearly â‚¬250,000 per week while withdrawals equalled around â‚¬220,000, with the remaining amount removed from recycling (excess and poor quality notes).

Translate »

As a result, in a year just one Q-Cash Router was able to recirculate â‚¬24.4m, reducing Swedbankâ€™s costs for cash transportation and processing by 50%. Between 80-90% of cash deposited was recycled without need for transportation. The evaluation has shown that local recycling works well with highly positive feedback received from customers, retailers and the bank.

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Publicerad: 2003-05-27

Följande text publicerades även under vinjetten ”Porträttet” i Entré nr 2, 2002:

Leif Lundblad, superentreprenör och grundare av Esbri:

”Forskning måste vara begriplig, läsbar och användbar”

Han kallar sig själv för återfallsentreprenör och har aldrig haft ett vanligt jobb. Sitt första företag startade han vid 17 års ålder. Sedan dess har det bara rullat på.
- Jag kan inte låta bli att hela tiden se nya möjligheter, säger Leif Lundblad.

Leif Lundblad har alltid gillat tekniska prylar. Han plockade isär sin första radioapparat när han var fem. Att sätta ihop den var svårare. Experimentet resulterade i smisk på rumpan och ett beslut om att bli radioreparatör. Hans första företag var mycket riktigt en radio- och tv-servicefirma.

Sedan dess har Leif Lundblad hunnit starta ett tiotal företag och erhållit över 300 patent. Han har varit verksam inom de mest varierade områden, som trädgårdsanläggning, schakt och sprängning och fasadtvätt. Han tycker att klimatet för entreprenörskap har förändrats avsevärt sedan han själv var nybörjare på området.

- Det har blivit accepterat med entreprenörskap, rentav någon fint. Och det har blivit accepterat att lyckas. Snart kanske det även är okej att misslyckas. Det är viktigt, man lär sig mycket på att göra fel, säger Leif Lundblad som idag bland annat driver företaget Nybohov Invest.

Men det finns fortfarande områden där han menar att det finns mer att hämta. Det gäller inte bara inom företagarvärlden.

- Det behövs entreprenörskap inom alla områden, inte bara teknik. Jag skulle gärna se en mer entreprenöriell politik, sättet att driva ett land på skulle kunna effektiviseras en hel del. Likaså sättet att bedriva undervisning. Rent generellt tror jag att ett utvecklat entreprenörskap kan förbättra situationen och tillväxten i samhället.

Han menar att det bor en entreprenör i oss alla. Annars skulle vi inte klara av att utbilda oss, göra karriär, gifta oss och skaffa bil och sommarställe. Sedan har vi olika förutsättningar bland annat beroende på vilja, kunskap och vilka kontakter vi får genom livet.

- Det går att utveckla entreprenörskapet mycket. Det handlar om att utveckla sin förmåga att bli bättre. Det finns en kick i det som skapar nya ambitioner. Precis som för folk som joggar mycket.

Esbri som katalysator

För fem år sedan grundade Leif Lundblad Esbri. Samtidigt inrättades, via en separat donation, en ny professur vid Stockholms universitet: Leif Lundblads professur i entreprenörskap och småföretagande.

- Tanken med Esbri är att både att ta fram och sprida kunskap som kan användas för att förbättra entreprenörskapet. Att öka förståelsen för entreprenörskap och få folk i allmänhet att använda det i sin dagliga verksamhet. Här tror jag att vi har fyllt en viktig funktion.

Leif Lundblad menar att Esbri har fungerat som en katalysator för entreprenörskapet i Sverige. Inte minst vad gäller kunskapsspridning.

- De senaste fem åren har intresset för entreprenörskap växt. Det har det blivit en väldig fart! Alla universitet och högskolor ska ha forskning och framför allt utbildning i entreprenörskap.

Leif Lundblad tycker att även forskningsvärlden skulle må bra av att bli lite mer entreprenöriell.

- Forskning måste vara begriplig, läsbar och användbar. Man måste kunna plocka ut godbitarna ur forskningen. Det gäller att fånga människors intresse, precis som i en roman. Som det ser ut i dag är forskningsvärlden lite komplicerad.

När det kommer till intressanta forskningsområden nämner Leif Lundblad bland annat sammanhanget mellan samhälle, människor och teknik. Funktionell design är ett annat område han gärna skulle se att det forskades mer inom.

- Själv lägger jag mycket tid på att en produkt ska vara kramgo, funktionell och kunna användas av alla. Därför är det kul att ett område som design börjar komma på modet.

Pengar inte drivkraft

Att Leif Lundblad är en framgångsrik entreprenör är ingen hemlighet. Han har fått alla priser som går att få inom företagande och entreprenörskap, och hans kontor är belamrat med utmärkelser och diplom. Bland annat hamnade han på elfte plats på tidningen Entreprenörs topplista över 1900-talets svenska superentreprenörer. Första plats innehas av Ingvar Kamprad. Leif Lundblads företag var också svensk mästare i export 1985. Vad finns det då för drivkraft kvar?

- Ja, det handlar i alla fall inte bara om pengar. Visst är det kul att tjäna pengar, men det är inte det som driver entreprenören. Det är helt underbart att gå runt i fabriken och se hur mina maskiner spottas ut i lådor märkta med till exempel Spanien, Singapore eller USA.

Fakta

Namn: Leif Lundblad

Bakgrund: Livets hårda skola. Ett livslångt entreprenörskap inom områden som radio/tv, grävmaskiner och trädgårdsbranschen. Har bland annat uppfunnit sedelutmataren till bankomater och bankkassor.

Aktuell: Grundare av Esbri som i år firar femårsjubileum.

För mer info: leif.lundblad@banqit.com

Text: Jonas Gustafsson

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Germany

ATM pioneer looks to change banking again

Leif Lundblad is trying to cut cash machine costs

Andrew Ward MAY 18 2011

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Leif Lundblad was in his 50s when he sold the company he had set up for $160m two decades ago, but instead of settling down into a long and golden retirement he decided to start all over again. Now the 72-year-old Swede believes he is on the verge of another success.

Mr Lundblad made his first fortune developing some of the early technology behind automatic teller machines (ATMs); now he claims his latest innovation could prove just as revolutionary for the banking sector. His "Super ATM" takes the banknotes deposited by local businesses at their bank and automatically recycles them for withdrawal by other customers – greatly reducing the amount of cash that banks need to move to and from branches as well as all the costly security that goes with it.

His latest initiative reflects a combination of mechanical skill and entrepreneurial spirit that has been apparent in Mr Lundblad since childhood – although his early efforts were not always successes. “I remember trying to fix my grandparents’ radio when I was six,” he recalls. “After half an hour, it was in pieces and irreparable. My dad was quite cross but from that moment I decided I was going to be a radio repair man.”

He stuck to his goal and, after leaving school at 17, he set up a radio repair business, with a lucrative sideline in importing television sets from Germany just as the technology was taking off in 1950s Sweden. He soon diversified into other ventures ranging from dynamite-blasting to cleaning the facades of old buildings. “I would phone up the owner of a dirty house and offer to clean part of the building for free to demonstrate the technique,” he chuckles. “The contrast between the clean and dirty sections was so great, they usually paid to have the rest done.”

Mr Lundblad even came up with his own blend of chemicals to remove the grime and started licensing it across Europe. It was an early example of his flair for spotting an unmet need and developing a product to fill the gap.

Impeccably groomed with a thin moustache and a handkerchief folded in his breast pocket, Mr Lundblad looks as though he inhabits a different universe from the latest generation of hip young Swedish entrepreneurs such as Daniel Ek of Spotify and Niklas Zennström, co-founder of Skype. Yet, while his innovations may lack the glamour of an internet start-up such as Skype and Spotify, he too can be called a technological trailblazer.

His cash-recycling machine is the culmination of almost three decades of work that started when a friend who ran a petrol station asked him to come up with a mechanism to prevent employees stealing cash. That started a chain of innovations that led to him developing one of the first automated-teller systems used by bank clerks to dispense money without having to count it out manually.

Citibank heard about the product in the late 1970s and sent representatives across the Atlantic to see it. “They came to my living room in Stockholm to look at a prototype,” says Mr Lundblad. “By the end of the meeting they had ordered 761 to install in all their banks on Manhattan.”

It was the breakthrough that transformed Mr Lundblad from a small-scale serial entrepreneur into the owner of a successful international company, called Inter Innovation. Soon, his cash dispensing system was being snapped up by banks around the world and integrated into the first generation of ATMs.

Inter Innovation grew from seven employees to 2,000 and listed on the Stockholm stock exchange before eventually being bought by De La Rue, the UK-based banknote printer, in 1991.

Mr Lundblad decided to stay focused on ATMs after selling Inter Innovation because he saw that there was still huge potential for more automation in retail banking. Instead of setting up a new company, he acquired a small Swedish ATM manufacturer called Banqit to use as a platform.

Initially, Mr Lundblad entrusted the business to professional managers, but he grew frustrated at the slow pace of innovation and eventually took over as chief executive: “We had a good managing director, but I felt we needed a more entrepreneurial approach, focused on developing the product rather than the organisation.”

Revenues fell from SKr82m in 2009 to SKr33m last year as sales of older ATMs declined, leaving the company increasingly dependent on Mr Lundblad’s new cash-recycling machine, called the Q-Cash Router, taking off.

He is not without rivals in his venture. Bigger ATM manufacturers, such as Diebold of the US and Wincor Nixdorf of Germany, have developed similar products but Mr Lundblad says his can handle larger volumes of money and detect forged or stolen notes more reliably.

An executive at a rival company admits the Q-Cash Router is an “excellent product” but says it is more technically complex than others on the market.

Showing off a demonstration model at Banqit’s headquarters near Stockholm, Mr Lundblad’s boyish enthusiasm in his invention is clear to see. Whereas other cash-recycling machines receive and dispense banknotes from the same ATM, he explains, Banqit’s has a separate booth for making deposits and two adjacent machines for withdrawals. This allows three people to be served simultaneously, with the deposited cash feeding the two dispensers. Agreements are made with local retailers to ensure a steady flow of money into the system.

Trials by Swedbank, one of Sweden's biggest banks, have shown a halving in the volume of cash handled by branches using the machine, implying huge savings if adopted across the industry. Banks in the European Union alone spend an estimated €50bn-€70bn a year moving and storing physical banknotes.

Sceptics might question whether the ATM market is a smart place to be investing at a time when cash is increasingly being displaced by electronic payments. Yet Mr Lundblad insists there will always be a place for physical money and says the total amount in circulation is still increasing because of growth in emerging markets.

Indeed, he sees China as one of the most promising export markets for his product.

While convinced of its potential, Mr Lundblad does admit that Banqit needs help to make the Q-Cash Router a success. Talks have been held with several bigger ATM makers about possible investment.

"I'm 72 and the market window is now, so I don't have time to patiently build up the business like in the past," he says.

Even if he sells a stake in the business, Mr Lundblad wants to stay involved until the product comes to fruition. Then, he says, it will be time to move on to his next idea – an automatic pancake maker to produce crepes for his three grandchildren as easily as making a cup of coffee.

"The risk for a guy like me is that you don't know if you will survive when you stop working," says Mr Lundblad. "I have a goal to be 100 and healthy and still inventing."

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NEWS

BANQIT to use Wincor Nixdorf's CINEO cassette storage technology

Jan. 9, 2012

Cash solution provider BANQIT AB has signed a strategic agreement with Wincor Nixdorf to use Wincor's CINEO banknote storage technology for its Q-CashRouter. The Q-CashRouter from BANQIT is a cash recycler solution for locations with a high volume of banknotes.

According to a company press release, BANQIT is implementing the technology to complement its own cash recycling technology.

"Wincor Nixdorf´s intelligent CINEO cassette technology integrated in the Q-CashRouter, with its four customer fascias for simultaneous multiple transactions at high-volume locations, offers banks key benefits such as lower cash handling costs, improved processes and better security," said Leif Lundblad, CEO and founder of BANQIT AB.

CINEO is the new system generation from Wincor Nixdorf comprising cash recycling systems, ATMs, automated teller safes and transaction terminals, and is part of its Cash Cycle Management Solutions portfolio.

For more information on this topic, visit our cash management research center.

Manufacturers Vault Cash / Cash Management Wincor Nixdorf International

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BANQIT to supply ATMs to leading Swedish bank

March 30, 2003

STOCKHOLM -- SEB, a leading commercial bank with 670 branches in Sweden, Germany and the Baltic states, has signed an agreement with Swedish ATM manufacturer BANQIT for 34 of BANQIT's model Q-CashExterior 25 cash dispensers.

According to a news release, the machines, which are designed for through-the-wall placements, will replace older ATMs in Stockholm and Gothenburg.

The software application was developed by SEB and will run on a Microsoft Windows NT platform, according to the release. It will use WOSA/XFS for interfacing the machines' different components, via BANQIT's application software Q-ConnectXFS.

Installation and maintenance support will be handled by Siemens Business Service Sweden.

The deployment will begin later this year and is expected to wrap up in early 2004.

Bank / Credit Union Manufacturers

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Bank of America awards $3M grant for Obama Foundation in Chicago

Bellwether Community Credit Union appoints VP of HR

Metropolitan Commercial Bank brings on former Fifth Third Bank employees to VP roles

Philadelphia police identify suspect in ATM shooting/robberies

Florida man pulls gun on ATM user due to impatience

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NCR mulls selling digital banking business

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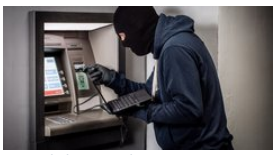

Examining cutting edge ATM software attacks

BANK CUSTOMER EXPERIENCE (BCX) SUMMIT

September 12-13, 2023 | Charlotte, NC

Bank Customer Experience Awards nominations close June 2

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STRATEGIC PARTNERS

HGL

PRESSMEDDELANDE

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HGL och BANQIT gör strategisk affär

Elektronik- och mekatronikföretaget HGL, med huvudkontor i Karlskoga, har idag gjort en överenskommelse att ta över IT-företaget BANQITs tillverkningsenhet med drygt 40 anställda i Järfälla. Övertagandet, som är ett led i en kommande börsintroduktion, innebär att HGL nu etablerar sig i Stockholm under namnet HGL Stockholm AB.

För HGL innebär övertagandet av en komplett fabrik med yrkesskicklig personal i Stockholm en helt ny resurs för att serva såväl befintliga som nya kunder.

- Det finns mycket stora expansionsmöjligheter för vår kompetens; kontraktstillverkning inom elektronik och mekatronik i Stockholmsområdet, säger HGL:s koncernchef Jan Skoglund.

I affären ingår ett långsiktigt produktionsavtal där HGL Stockholm AB kommer att tillverka sedelhanteringsprodukter åt BANQIT.

För BANQITs del innebär överlåtelsen att företaget nu kan koncentrera sina resurser på att utveckla nya produkter och ytterligare expandera sin försäljning runt om i världen, vilken för närvarande uppgår till 300 miljoner kronor.

- Vi på BANQIT är mycket nöjda över att HGL övertar ansvaret för tillverkning och leverans av befintliga och nyutvecklade produkter, säger BANQITs VD Christina Detlefsen.

HGL startades 1886 och reparerade då tröskverk i värmlandsskogarna. Idag är HGL en industrikoncern med fyra fabriker; HGL Karlskoga AB, precisionsmekanik och höghastighetsbearbetning, HGL Flen AB, apparattillverkning, HGL Ronneby AB, paketerad elektronik samt kretskortsmontage samt nytillskottet i HGL Stockholm AB, apparattillverkning. Koncernen kommer att omsätta ca 400 miljoner kronor under år 2000 och räknar med en tillväxt på drygt 25 procent år 2001. Se även: www.hgl.se.

BANQIT är ett kunskapsföretag med mer än 30 års erfarenhet från bank- och finanssektorn. Företaget ligger långt framme beträffande systemintegration och egenutvecklad programvara. Den utgör en grund för bankernas nya kundstrategi att på ett effektivare sätt sälja tjänster och

HGL

produkter till sina kunder. Vad gäller sedelhanteringsprodukter har BANQIT profilerat sig genom att effektivare kundanpassa sina produkter till bankernas och deras kunders speciella krav. Se även: www.banqit.com.

Ytterligare upplysningar lämnas gärna av:

VD Christina Detlefsen, BANQIT, tel: 08-759 46 00 eller e-post: info@banqit.com.
Koncernchef Jan Skoglund, HGL, tel: 0708-59 52 71 eller e-post: jan.skoglund@hgl.se

POWER PRODUCTS

VAŠ KIOSK PARTNER

Samouslužni terminali

JAN • 2008

Profil kompanije

Kompanija POWER products s.r.o. je nastala 1996.godine spajanjem kompanija Graphic products s.r.o. i Business Power Systems s.r.o. Više od dvadeset godina se bavimo prodajom, servisiranjem i proizvodnjom specijalizovane IT opreme.

Dugogodišnji rad u ovoj oblasti nam je omogućio da postanemo vodeći snabdevač kioska, samouslužnih terminala, specijalnih monitora, LCD panela, touchscreen-ova, industrijskih i vojnih monitora.

Dizajniramo i proizvodimo kioske modernog izgleda, koji se mogu opremiti dodatnim uređajima. U mogućnosti smo da ponudimo atraktivna i povoljna rešenja za najraznovrsniju poslovnu i informativnu primenu. Velika fleksibilnost nam omogućava da izađemo u susret najraznovrsnijim zahtevima i potrebama naših klijenata u pogledu izgleda i funkcionalnosti kioska.

U ovom trenutku proizvodnja kioska iznosi oko 5000 jedinica godišnje.

Power products je takođe specijalizovana kompanija za integraciju touchscreen LCD-ova i distribiciju prateće opreme koja uključuje touchscreen senzore i kontrolere, kiosk i OEM printere i tastature, uređaje za prihvatanje novčanica i metalnog novca, bar-kod čitače, čitače kartica...

Zaposleni su Vama na usluzi.

Našu specijalnost predstavlja proizvodnja monitora za rad u specifičnim uslovima (posebni klimatski, mehanički, elektronski uslovi npr. vojna i industrijska primena).

Godišnji obrt kompanije raste iz godine u godinu i trenutno iznosi preko 7 miliona Evra. Zapošljavamo preko 40 visoko kvalifikovanih i motivisanih stručnjaka, čiji je cilj da zadovolje najrazličitije zahteve naših klijenata.

Od 2002. godine posedujemo ISO 9001:2001 standard za kontrolu kvaliteta u prodajnim sistemima, proizvodnji, IT uslugama, elektronskom i elektro-inženjeringu.

POWER products s.r.o. je progresivna kompanija sa širokom mrežom lokalnih kancelarija i predstavnika, kao i pažljivo odabranim, specijalizovanim distributerima u više od 20 zemalja Evrope, Bliskog Istoka, Afrike i Južne Amerike.

Eagle je naš najrasprostranjeniji kiosk pogodan za primenu u zatvorenim prostorima i isporučuje se u različitim varijantama. Kombinuje atraktivni dizajn sa vrhunskim kvalitetom izrade.
Opis modela Eagle standard:
• Dimenzije 1550(v) x 500(š) x 430(d) mm
• Aluminijumska konstrukcija sa metalnim i plastičnim komponentama
• Sigurno izvedene instalacije • Veliki izbor boja
• Fleksibilno rešenje za ugradnju dodatnih periferija

Standardna specifikacija:
• 17″ LCD monitor sa touchscreen-om
• Metalna tastatura sa integrisanim mišem
• Dell 745 SF konfiguracija, sa garancijom 3 godine • Aktivni zvučnici

Električna instalacija:
Potpuno sigurno izvedena instalacija koja omogućava kompletnu zaštitu korisnika i hardvera. CE sertifikacija. Instalacija uključuje:
• zaštitu od strujnog udara sa integrisanim 16A prekidačem • zaštitu od visokog napona

Eagle Standard

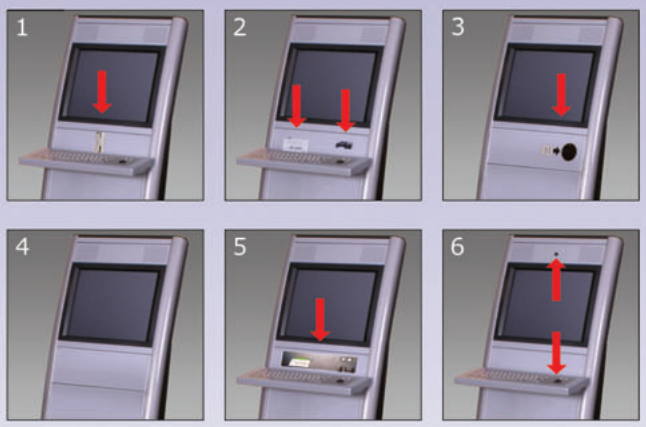
Opcije (periferije):
• 15″ i 19″ LCD monitori sa touchscreen-om
• 15″, 17″ ili 19″ LCD monitori sa sigurnosnim zaštitnim staklom • Senzori za zaštitu od vandalizma • Anti-refleksno staklo • Termalni printer 60-210 mm • Web kamera
• Telefonska slušalica • čitač kartica (magnetne, čip, bezkontaktne) • Bar-kod čitač • Web pretraživač – POWER BROWSER• Izbor posebnih boja i grafičkih prikaza
• WiFi • Dodatne periferije po izboru

Eagle je dostupan u različitim bojama i hardverskim konfiguracijama. Prostor na prednjem delu je pogodan za postavljanje kompanijskog logoa ili drugi vid grafičke prezentacije (prema zahtevu korisnika)

Eagle Shift Table

(sa pokretnim stolom)

Za decu i korisnike u invalidskim kolicima razvijen je Eagle model sa mogućnošću podizanja i spuštanja (do 50 cm). Izvođenje ove operacije omogućeno je zahvaljujući ugrađenom posebnom motoru. Specifikacije, opcione periferije, električne instalacije – isto kao i kod modela Eagle standard.



1. Eagle sa modulom za prihvatanje kovanog novca
2. Eagle sa 112mm termalnim printerom i hibridnim čitačem kartica
3. Eagle sa bar-kod čitačem
4. Eagle sa touchscreen-om, bez tastature
5. Eagle sa 80 mm termalnim printerom, hibridnim bar-kod i čitačem kartica
6. Eagle sa kamerom i tastaturom sa ugrađenim mišem

Rešenje za marketing i reklamni kiosk je najpogodnije za prodajne i promotivne aktivnosti.

Eagle Wall

Ova verzija, koja se montira na zid, zadržava sve prednosti standardnog modela. Zahvaljujući varijabilnoj visini za instalaciju, omogućen je pristup deci i osobama u kolicima.
• Dimenzije: 845(v) x 500(š) x 380(ds)mm. • Aluminijumska konstrukcija sa metalnim i plastičnim komponentama
• Veliki izbor boja • Sigurnosna brava

Standardna specifikacija, opcione periferije i električna instalacija su isti kao i kod Eagle standard modela.

Eagle Shift (podesiv po visini)

Još jedan model posebno dizajniran za korisnike u invalidskim kolicima sa jednostavnim upravljanjem. Pritiskom na taster, moguće je vrlo lako pomeriti ekran u željeni položaj, brzo i tiho. Razlika između najniže i najviše tačke iznosi 50cm.

Standardna specifikacija, opcione periferije i električna instalacija su isti kao i kod Eagle standard modela.

Eagle Medium

Eagle medium model kao dodatak i prednost poseduje sigurnosni multi-lock mehanizam i veće i dublje kućište na zadnjoj strani. Ovi dodaci, čine ga pogodnim za različite primene plaćanja i ugradnju većih, dodatnih periferija. Dovoljno je siguran, da ne mora biti pod kontrolom.
• Dimenzije 1550(v) x 500(š) x 430(d) mm.
• Aluminijumska konstrukcija sa metalnim i plastičnim komponentama • Sigurno izvedene instalacije • Veliki izbor boja • Mogućnost postavljanja različitih grafičkih rešenja • Fleksibilno rešenje za ugradnju dodatnih periferija

Standardna specifikacija:
• 17″ LCD monitor sa touchscreen-om
• Metalna tastatura sa integrisanim mišem
• Dell 745 SF konfiguracija, sa garancijom 3 godine • Aktivni zvučnici

Drugi uređaji se mogu pridodati na zahtev korisnika.

Električna instalacija:
Potpuno sigurno izvedena instalacija koja omogućava kompletnu zaštitu korisnika i hardvera. CE sertifikacija. Instalacija uključuje:
• zaštitu od strujnog udara sa integrisanim 16A prekidačem • zaštitu od visokog napona

Kiosk za novčane transakcije (sleva na desno): • Štampač priznanice • čitač kartica • uređaj za prihvatanje novca

Eagle Magnum

Ova pojačana verzija Eagle-a dizajnirana je za ugradnju crno-belog laserskog štampača i poseduje prilaz sa prednje strane. Podržan je širok izbor dodatnih periferija.

• Dimenzije 1550(v) x 500(š) x 405/480/540(d) mm • Aluminijumska konstrukcija sa metalnim i plastičnim komponentama • Sigurno izvedene instalacije • Veliki izbor boja • Mogućnost postavljanja različitih grafičkih rešenja • Fleksibilno rešenje za ugradnju dodatnih periferija

Standardna specifikacija: • 17″ LCD monitor sa touchscreen-om • Metalna tastatura sa integrisanim mišem • Dell 745 SF konfiguracija, sa garancijom 3 godine
• Aktivni zvučnici • Drugi uređaji se mogu pridodati na zahtev korisnika

Varijanta 1: Sa opcijom plaćanja
Varijanta 2: Bez tastature, sa laserskim printerom
Varijanta 3: Sa tastaturom i laserskim printerom

Električna instalacija:
Potpuno sigurno izvedena instalacija koja omogućava kompletnu zaštitu korisnika i hardvera. CE sertifikacija. Instalacija uključuje:
• zaštitu od strujnog udara sa integrisanim 16A prekidačem • zaštitu od visokog napona

Eagle Jumbo

Proširena verzija Eagle-a, koja je projektovana da podrži kolor laserski štampač ili crno-beli laserski štampač velikog kapaciteta. Podržan je veliki izbor dodatnih periferija.
• Dimenzije 1550(v) x 540(š) x 564(d) mm. • Aluminijumska konstrukcija sa metalnim i plastičnim komponentama • Sigurno izvedene instalacije • Veliki izbor boja • Mogućnost postavljanja različitih grafičkih rešenja • Fleksibilno rešenje za ugradnju dodatnih periferija

Standardna specifikacija:
• 17″ LCD monitor sa touchscreen-om • Metalna tastatura sa integrisanim mišem • Dell 745 SF konfiguracija, sa garancijom 3 godine • Aktivni zvučnici

Drugi uređaji se mogu pridodati na zahtev korisnika.

Električna instalacija:
Potpuno sigurno izvedena instalacija koja omogućava kompletnu zaštitu korisnika i hardvera. CE sertifikacija. Instalacija uključuje:
• zaštitu od strujnog udara sa integrisanim 16A prekidačem • zaštitu od visokog napona

Eagle Custom

Zahvaljujući veoma fleksibilnom dizajnu EAGLE je idealan kiosk za implementaciju vaših posebnih zahteva. Kako se može videti na slikama dole, podržava skoro svaku aplikaciju koju možete zamisliti.

Photo Eagle
Prihvata fotografije sa svake memorijske kartice, CD/DVD, ili preko bluetooth-a i infra-red-a. Plaćanje se može vršiti metalnim novcem, papirnim novčanicama ili karticama. Štampač visokog kvaliteta se može koristiti za trenutno štampanje fotografija.

Flight Ticket Eagle (za štampanje avionskih karata)
Opremljen je sa: • 17″ LCD monitor sa touchscreen-om • Čitač kartica • Pinpad tastatura • Štampač priznanice • Štampač avionskih karata

Hawk

Model Hawk sa svojim vrhunskim kvalitetom izrade predstavlja idealan kiosk za sve aplikacije u spoljnim uslovima. Pogodan je za različite primene (npr. javni informativni sistemi- turistički i gradski informativni sistemi). • Dimenzije: 1820(v) x 570(š) x 210(d) mm. • Kompletna metalna konstrukcija • Veliki izbor boja

Standardna specifikacija:

• 17" LCD monitor sa touchscreen-om sa ugrađenom zaštitom od vandalizma • Metalna tastatura sa integrisanim mišem • Dell 745 SF konfiguracija, sa garancijom 3 godine • Aktivni zvučnici

Dodatne opcije:

• 15" ili 19" LCD monitor sa touchscreen-om • 15",17" ili 19" LCD monitor sa sigurnosnim zaštitnim staklom • LCD monitor za uslove povećanog osvetljenja • Tastatura • Ugrađeni miš • Termalni printer 60 - 112 mm. • WEB kamera • Telefonska slušalica • Čitač kartica (magnetne, čip i bezkontaktne) • Bar-kod čitač • Posebne boje i grafička rešenja • Metalni krov sa osvetljenjem • Postolje izrađeno od nerđajućeg čelika

• Jedinica za daljinsko upravljanje • WiFi

Oprema za upotrebu u spoljnim uslovima:

Šasija - kućište obloženo zaštitnim slojem cinka. Specijalna RAL boja za spoljnu upotrebu. Sigurnosna brava. Kompletna termalna izolacija. Poseban način sprovođenja električnih instalacija zbog maksimalne sigurnosti korisnika i zaštite samog uređaja. Temperatura i vlažnost vazduha u samom uređaju su kontrolisani standardno ugrađenim termostat i higrostat senzorima. Električne instalacije uključuju:

• Zaštitu od strujnog udara • Zaštitu od visokog napona • Dva prekidača • Termostat i higrostat • Ventilaciju i grejanje

Kao što možete videti na slikama, Hawk model vam nudi izuzetan prostor za postavljanje reklamnih poruka. Isporučuje se u širokoj paleti boja u skladu sa RAL standardom.

Hawk sa postoljem od nerđajućeg čelika

Različiti primeri primene Hawk kioska

Hawk Wall

Uspešna zidna verzija Hawk-a
• Dimenzije: 1200(v) x 570(š) x2 10(d) mm.
• Kompletna metalna konstrukcija • Veliki izbor boja

Druge karakteristike
(videti model Hawk na levoj strani)

Uređaj za kontrolu klime u unutrašnjosti Hawk kioska

Hawk Drive-In
Specijalna Hawk verzija koja je prilagođena procesu automatizacije naručivanja u drive-in restoranima brze hrane. Standardna verzija je opremljena mikrofonom i zvučnicima, detektorom prisustva automobila, LCD monitorom za uslove povećanog osvetljenja, kompletnom opremom za korišćenje u spoljnim uslovima kao i zvučnom izolacijom i postoljem od nerđajućeg čelika.

Heron

Male dimenzije u kombinaciji sa atraktivnim dizajnom i vrhunskim kvalitetom izrade, dozvoljavaju vam da ovaj model kioska koristite za različite svrhe u zatvorenim prostorima.

- Dimenzije: 1100(v) x 420(š) x 350(d) mm.
- Zavarena metalna konstrukcija od čelika debljine 2 mm
- Veliki izbor boja • Sigurnosna brava • Pokretno postolje koje omogućava instalaciju na različitim lokacijama

Standardna specifikacija:

- 17" LCD monitor sa touchscreen-om
- Dell 745 SF konfiguracija, sa garancijom 3 godine

Dodatne opcije:

- 15" LCD monitor sa touchscreen-om • Senzor za zaštitu od vandalizma • Termalni printer 60-112 mm. • Web kamera • Telefonska slušalica • Čitač kartica (magnetne, čip i bezkontaktne) • Bar-kod čitač • Uređaj za prihvat novčanica • Uređaj za prihvat kovanog novca
- Poseban izbor boja i grafičkih rešenja • UPS • WiFi

Drugi uređaji se mogu pridodati na zahtev korisnika.

Električna instalacija:
Potpuno sigurno izvedena instalacija koja omogućava kompletnu zaštitu korisnika i hardvera. Električne instalacije uključuju:

- Zaštitu od strujnog udara
- Zaštitu od visokog napona
- Prekidač
- Ventilatore

Heron u Čileu

Grupa Heron kioska na aerodromu u Pragu

Budgie

Desktop Budgie kiosk je pogodan za većinu POS i zabavnih aplikacija u restoranima, kafeima i barovima. Može se koristiti kao registar kasa, džuboks ili konzola za igru. U foto industriji koristi se za izbor fotografija za dalju štampu.

- Dimenzije: 390(v) x 425(š) x 430(d) mm.
- Zavarena metalna konstrukcija od čelika debljine 2 mm.
- Veliki izbor boja

Standardna specifikacija:

- 17″ LCD monitor sa touchscreen-om
- Dell 745 SF konfiguracija, sa garancijom 3 godine

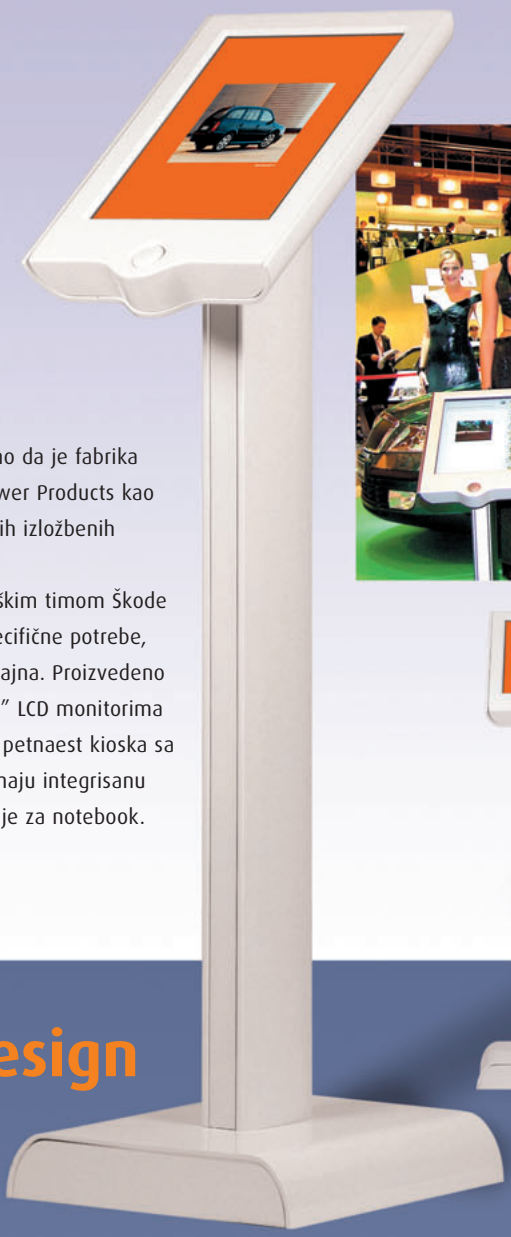
Dodatne opcije:

- 15″ LCD monitor sa touchscreen-om
- Senzor za zaštitu od vandalizma • Termalni printer 60 mm
- Web kamera • Telefonska slučalica • Čitač kartica (magnetne, čip i bezkontaktne) • Čitač memorijskih kartica i CD/DVD čitač
- Bar-kod čitač • Poseban izbor boja i grafičkih rešenja • WiFi

Drugi uređaji se mogu pridodati na zahtev korisnika.

Škoda Auto Kiosk

Zadovoljstvo nam je da kažemo da je fabrika automobila Škoda izabrala Power Products kao partnera u proizvodnji posebnih izložbenih kioska za svoje potrebe.
U bliskoj saradnji sa marketinškim timom Škode i uzimajući u obzir njihove specifične potrebe, razvijen je kiosk posebnog dizajna. Proizvedeno je četrdeset i pet kioska sa 15" LCD monitorima sa mogućnošću izbora jezika i petnaest kioska sa LCD monitorom od 17", koji imaju integrisanu web kameru i pokretno postolje za notebook.



Custom Design

(Dizajn po vašoj želji)
Fleksibilnost i saradnja sa našim klijentima omogućava nam da dizajniramo i proizvodimo kioske prema posebnim željama i zahtevima. Na sledećim fotografijama možete videti neke od primera jedinstvenih kioska, koji se mogu proizvoditi i u malom broju.

Kiosk za rad sa dokumentima

Ovo rešenje je pripremljeno za rad sa dokumentima. Na jednom mestu korisnik može ispuniti, skenirati, štampati, potpisati, izvršiti autorizaciju, primiti i poslati dokumenta kao što su polise osiguranja, poreske prijave, računi itd. Ovaj kiosk, takođe, može biti povezan za eksterni call-centar sa on-line komunikacijom.
Moguća konfiguracija:
• Kamera • Zvučnici • 19" LCD monitor sa touchscreen-om • Telefonska slušalica • Skener • Tastatura sa ugrađenim mišem • Laserski štampač • Uređaji za plaćanje • WiFi • PC • UPS • ...

Mark-4

Kiosk jedinstvenog dizajna proizveden po zahtevu našeg klijenta yq? International iz Irske. Sastoji se od: • 15" LCD monitora sa touchscreen-om • Uređaja za prihvat i prepoznavanje novčanica • Uređaja za prihvat metalnog novca • Termalnog printera • UPS-a • GPRS modema

Music Box

Kiosk jedinstvenog dizajna, razvijen na zahtev našeg korisnika u cilju promovisanja njegovih proizvoda u barovima, pabovima, klubovima i restoranima. Korisnički orijentisan 'touch' Džuboks softver kontroliše audio-video multimedije i fajlove sa reklamnim porukama.

EVA – elektronska administracija

Eva kiosk omogućava korisnicima udaljeni pristup informacijama i servisima lokalne administracije. Omogućeno je i kompletiranje i predaja određenih dokumenata i drugih formulara, preko jednostavnog programa prilagođenog korisniku.

LCD monitori

15" LCD TFT ekran.
Rezolucija: 1024 x 768.
Osvetljenje 250 ili 1500 cd/m^2 opciono.
Kontrast 400:1. Analogni ulaz.
Touchscreen opcija.

17" LCD TFT ekran.
Rezolucija: 1280 x 1024.
Osvetljenje 250 ili 1500 cd/m^2 opciono.
Kontrast 450:1. Analogni ulaz.
Touchscreen opcija.

19" LCD TFT ekran.
Rezolucija: 1280 x 1024.
Osvetljenje 270 cd/m^2. Kontrast 550:1.
Analogni ulaz.
Touchscreen opcija.

Tastature

Metalna tastatura bez ugrađenog miša
Internet funkcionalni tasteri.
Prilagođenost nacionalnim fontovima.
PS2 ili USB interfejs.

Metalna tastatura sa ugrađenim mišem
Internet funkcionalni tasteri.
Prilagođenost nacionalnim fontovima.
PS2 ili USB interfejs.

Metalna numerička tastatura, tasteri, ugrađeni miš i touchpad su takođe dostupni.
PS2,USB ili Matrix interfejs.

Personalni računari

Kompletna ponuda Dell desktop računara pruža vam visoke performanse, pouzdanost i potpunu fleksibilnost konfigurisanja
Garancija 3 godine

Dell Optiplex 745 Small Factor
Custom konfiguracija
Garancija 3 godine

Dell Optiplex 745 Ultra Small Factor
Custom konfiguracija
Garancija 3 godine

Štampači

Termalni printer TG 35/58-T
Papir širine 35 ili 58 mm.
Brzina štampanja >42 mm/sec.
Prečnik papirne rolne max. 70mm.
Tear-off sistem za papir. RS232 interfejs.

Termalni printer VKP 80. Papir širine 60 ili 80 mm. Brzina štampanja >220 mm/sec.
Prečnik papirne rolne max. 135mm.
Ugrađene funkcije za sečenje, izbacivanje i uvlačenje papira. RS232 i USB interfejs.

Termalni printer KPM 210/216H. Papir širine 210 ili 216mm. Brzina štampanja >125 mm/sec. Prečnik papirne rolne max. 180 mm.
Ugrađene funkcije za sečenje, izbacivanje i uvlačenje papira. RS232 i USB interfejs.

Čitači kartica

Hibridni čitač kartica SCR 28.
Čitač smart, memorijskih i magnetnih kartica. Ručni unos drajvera i biblioteka za Windows, CE, Linux.
RS232 ili USB interfejs.

Hibridni čitač kartica ICM 330.
Čitač smart, memorijskih i magnetnih kartica.
Ručni unos, zaštitni poklopac EMV.
RS232 ili USB interfejs.

Motorizovani hibridni čitač kartica ICM 330.
Čitač smart i magnetnih kartica.
1 SAM socket na ploči.
Zaštitni poklopac EMV.
RS232 ili USB interfejs.

Uređaji za prihvat novčanica i kovanog novca

Uređaj za prihvat novčanica NV8.
Nisko budžetni uređaj za proveru više valuta.
Baza podataka za različite valute.

Uređaj za prihvat novčanica NV9.
Napredni sistem za proveru novca.
Do 32 različite novčanice.
Baza podataka za različite valute.

Uređaj za prihvat kovanog novca EMP 850.
32 aktivna kanala.
Do 16 različitih kovanica ili žetona.
Prednja ploča od nerđajućeg čelika.
RS232 ili USB interfejs.

Drugo

MiniScan serija Bar Kod čitača.
640 skeniranja u sekundi.
Laser, raster tehnika.
RS232 ili USB interfejs.

Telefonska slušalica.
Metalni kabl otporan na vandalske napade.
PC zvučna kartica.

Web kamera.
VGA rezolucija 640 x 480.
60 frejmova u sekundi.
Windows drajveri.
USB interfejs.

Softver

Kiosk - sigurni internet pretraživač.
Grafički interfejs.
Sigurna administracija. Različite mogućnosti plaćanja (kartica, gotovina...).

Softverska rešenja za: marketing (reklame, promocije,prodaja), informacije, zabavu, komunikacije i usluge.
Udaljena i centralna sinhronizacija i administracija.

On-line sistem nadzora.
On-line informacije o statusu.
E-mail, SMS izveštaji, alarmi, zbirni dijagrami.
Izveštavanje i statistička baza podataka.

POWER products s.r.o.
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Czech Republic
Phone: +420 272 760 365
Fax: +420 272 760 366
Web: www.power-kiosk.com
Email: info@power.cz

POWER PRODUCTS

VAŠ KIOSK PARTNER

Zeta system d.o.o.

Srbija
Golsvortijeva 1
11000 Beograd
Telefon: +381 11 308-52-08
Fax: +381 11 308-55-30
E-mail: office@zeta.co.yu

Bosna i Hercegovina
Jadranska bb
71000 Sarajevo
Telefon: +387 33 55-60-55
Fax: +387 33 55-60-56
E-mail: office@zeta.ba

Crna Gora
81000 Podgorica
Telefon: +382 67 500-901

Device Support List

Check Reader

Manufacturer	Device
CTS	LS100
CTS	LS150 (USB)
Keycorp	K33 Check Reader
Epson	TM-J9000 (Built-In Scanner and MICR)
MagTek	Excella STX MagTek USB
MagTek	Excella STX RNDIS USB
MagTek	Image MagTek (CHK)
MagTek	MagTek MICR Image

Coin Dispenser

Manufacturer	Device
DeLaRue	DeLaRue AccuChange for TCD
DeLaRue	DeLaRue Transact Coin (US coins)
DeLaRue	DeLaRue Transact Coin (Canadian coins)
Diebold	Diebold 1053 Coin Dispenser
Telequip	Telequip Transact 2+ (Coin Dispenser)
Telequip	Telequip Transact 2+ (Coin connected downstream to ARCA CM18)
Telequip	Telequip Transact
Telequip	Telequip Transact (for TCD)
Telequip	T-Flex
Telequip	T-Flex (Coin connected downstream to ARCA CM18)
Talaris	InstaChange (Coin direct connect to workstation)
Talaris	Talaris InstaChange (Coin connected downstream to TCD[1])
Talaris	Talaris InstaChange (Coin connected downstream to ARCA CM18)

Currency Dispenser

Manufacturer	Device
Arcatech	ARCA 2500
Arcatech	ARCA 2600
ASCOM	ASCOM Twin Safe I
ASCOM	ASCOM Twin Safe II
BANQIT	BANQIT MDDM
BANQIT	BANQIT NMD
Burroughs	UCD2600
Circomat	Twin Safe I Emulation
DeLaRue	TCD 2000
DeLaRue	TCD 9000
DeLaRue	TCD 9210
DeLaRue	TCD Benchmark
DeLaRue	TCD Benchmark Series 7
Diebold	Diebold 1053
Diebold	Diebold 220 (DeLaRue mode)

Note 1: See Release Notes for special instructions.

Last Updated: 8/9/2018

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Device Support List

Currency Dispenser (cont)

Manufacturer	Device
Diebold	Diebold 220 (ECD)
Glory	Glory PD-600
Glory	Glory PD-61
Glory	Glory PD-61WC
IBM	IBM 4733
IBM	IBM 4793
InterInnovation	TCD 5210
InterInnovation	TCD 9000
LeFebure	LeFebure TCD
NCR	NCR 5175
Nyvohov	MDRM CDM
Seimens Nixdorff	SNI BBA9927
Technitrol	Technitrol ACD
UNISYS	UNISYS TCD9000
Wincor-Nixdorf	PC1100AT

Currency Recycler

Manufacturer	Device
ArcaTech	ARCA 7000
ArcaTech	ARCA 8000
ArcaTech	ARCA CM18.8
ArcaTech	ARCA CM18.10
ArcaTech	ARCA CM18.12
ArcaTech	ARCA CM18S
ArcaTech	ARCA CM18T
ArcaTech	ARCA CM18 Solo
ArcaTech	ARCA CM18 Evo
Burroughs	SmartCash Compact Currency Recycler
Burroughs	SmartCash Dual Delivery
Burroughs	UCR7000
Burroughs	UCR8000
CTS	CTS CM14.8
CTS	CTS CM18S
CTS	CTS CM18.8
CTS	CTS CM18.10
CTS	CTS CM18.12
CTS	CTS CM18T
CTS	CTS CM 20
CTS	CTS CM 20S
CTS	CTS CM 20T
CTS	CTS CM 24.8
DeLaRue	TCR TwinSafe
DeLaRue	Vertera (5G, 6G running 5G emulation)

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Device Support List

Currency Recycler (cont)

Manufacturer	Device
Diebold	228 ECR (Serial / TCP/IP)
Diebold	228 ECR Gen II SitDown
Diebold	228 ECR Gen II Standup
Diebold Nixdorf	Diebold Nixdorf CS 6060 Seated
Diebold Nixdorf	Diebold Nixdorf CS 6060 Tall
Glory	GloryRBU-11
Glory	GloryRBG-100
Glory	RBG-100 G
Glory	Glory Vertera 6G (6G running 5G emulation)
Glory	Glory Vertera 6G (6G native - TCP/IP)
IBM	IBM 6818-8G0
IBM	TAU (Under Development)
LG	LTA-350
Nautilus Hyosung	MoniSafe 400A
Nautilus Hyosung	MoniSafe 500
NCR	NCR AST 7000NT (6610, NT3) - 8 roll (Serial over IP via MOXA)
NCR	NCR AST 7000NT5 (6611, NT5) - 8 roll (Serial)
NCR	NCR AST 7000NT5 (6611, NT5) - 8 roll (Serial over IP via MOXA)
NCR	NCR TCR Pro AST7012NT (6610) - 12 roll (Serial)
NCR	NCR TCR Pro AST7012NT (6610) - 12 roll (Serial over IP via MOXA)
Talaris	Talaris TCR TwinSafe - TwinSafe (using DeLaRue TCR TwinSafe interface)
Talaris	Talaris Vertera - TwinSafe ES (using DeLaRue interface)
Glory (pka Talaris)	Vertera (5G, 6G running 5G emulation)
Glory (pka Talaris)	Vertera (6G native)
Wincor-Nixdorf	ProCash 6000xe
Wincor-Nixdorf	ProCash 6100xe
Wincor-Nixdorf	Wincor-Nixdorf CINEO C60X0 (Serial / TCP/IP)

Magnetic Stripe Reader/Encoders (IDC)

Manufacturer	Device
BANQIT	BANQIT Model 1 (IDC)
BANQIT	BANQIT RS81-RS86
BANQIT	LK32 Msr
BANQIT	LK32 Smart Card
CAS	CAS K21 MCR
CAS	CAS K21 SCT (Smart Card)
Heng Yu	S128MTSC (IDC)
Hypercom	HFT 101 (with PINPad and TTU)
Hypercom	P1100 (with PINPad and TTU)
Hypercom	P2100 (with PINPad and TTU)
Hypercom	Paysec 101 Msr (with PINPad and TTU Msr=magnetic stripe reader)
Hypercom	Paysec 101 SmartCard (with PINPad and TTU)
IBM	IBM 4777 (Model 1, 2 and 3)

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Device Support List

Magnetic Stripe Reader/Encoders (IDC) (cont)

Manufacturer	Device
IBM	IBM 4779 (IDC) (with PIN and TTU)
Intellect	Intellect 7270 (IDC) (with PINPad and TTU)
KeyCorp	KeyCorp K21 MCR (with PINPad, TTU, MCR=magnetic card reader)
KeyCorp	KeyCorp K21 SCT SmartCard (with PINPad, TTU)
KeyCorp	KeyCorp K23 MCR (with PINPad, TTU, MCR=magnetic card reader)
KeyCorp	KeyCorp K23 SCT SmartCard (with PINPad, TTU)
KeyCorp	KeyCorp K33-001 IDC (Keyboard MICR and Smart Card Reader)
KeyCorp	KeyCorp K33-002 IDC (Keyboard MICR and Smart Card Reader)
KeyCorp	KeyCorp K33-111 IDC (Keyboard MICR and Smart Card Reader)
KeyCorp	KeyCorp K33-112 IDC (Keyboard MICR and Smart Card Reader)
KeyCorp	KeyCorp K33-222 IDC (Keyboard MICR and Smart Card Reader)
Magtek	IntelliStripe 65
Magtek	IntelliPIN RS-232 (MSR) (with PINPad and TTU)
Magtek	IntelliStripe 380 (Serial)
Magtek	IntelliStripe 380 MCP (USB)
Magtek	MagTek Mini Swipe USB (Magstripe Mini HID)
Magtek	MagTek Maxi MICR Card Reader (Maxi Wedge with MICR, IDC & PIN)
Magtek	MagTek Mini MICR Card Reader (Mini Wedge with MICR)
Magtek	MT-95 (Encode)
Magtek	MT-211-232 T1 & T2
Magtek	MT-211-232 T2
MS Windows	Windows Smart Card Reader
Nexus	Nexus M201-1
Nexus	Nexus M201-2
Nexus	Nexus M301
OnGroup	KeyMax 9_7 Multifunction Keyboard/Card Reader
Sankyo	Sankyo ICT3Q5-150 (ICT-3Q5- 3A0150)
Sankyo	Sankyo ICT3Q5-180 (ICT-3Q5- 3A0180)
Sankyo	Sankyo ICT3Q5-188 (ICT-3Q5- 3A0188)
Sankyo	Sankyo ICT4Q0-170 (ICT-3Q5-4Q0170)
SEAC	Seac RD 1000 EL (Magstripe) (with MICR)

MICR Reader

Manufacturer	Device
Epson	Epson TM-H6000II
Epson	Epson TM-H6000II APD (USB / TCP/IP)
Epson	Epson TM-H6000III
Epson	Epson TM-H6000III APD (USB / TCP/IP)
Epson	Epson TM-H6000IV
Epson	Epson TM-H6000IV APD (USB / TCP/IP)
Epson	Epson TM-J9000 (With Scanner and MICR)
Epson	Epson TM-U675
Epson	Epson TM-U675 APD (USB)
Epson	

Device Support List

PINPad

Manufacturer	Device
Ascom "BANQIT"	Ascom INT190
Ascom "BANQIT"	Ascom INT190/INT112
Ascom "BANQIT"	Ascom INT190/SWE113
Ascom "BANQIT"	Ascom SWE115
BANQIT	LK32 (with MSR / TTU)
CAS	CAS K21 Pinpad
Hypercom (ICL)	HFT106
Hypercom (ICL)	P1100
Hypercom (ICL)	P2100
Hypercom (ICL)	Paysec 101
IBM	IBM 4779 (with MSR and TTU)
Ingenico	i3300
Ingenico	iPP320
Ingenico	iPP350
Ingenico	iPP350 (PosGate)
Intellect	Intellect 7270 (with MSR and TTU)
KeyCorp	KeyCorp K21 (with MSR, TTU and Smart Card Reader)
KeyCorp	KeyCorp K23 (with MSR, TTU and Smart Card Reader)
MagTek	MagTek IntelliPIN RS-232 (PIN) (with TTU & IDC)
MagTek	IntelliPIN SPT MCP USB (with TTU and IDC)
MagTek	MagTek Maxi MICR Pinpad (Maxi Wedge (with IDC and MICR))
UIC	EPP790 (PIN)
Verifone	MX 925
Verifone	VX 820

Printers

Manufacturer	Device
Addmaster	Addmaster IJ-1000
Addmaster	Addmaster IJ-2000
Addmaster	Addmaster IJ-2040
Addmaster	Addmaster IJ-2040-01
Addmaster	Addmaster IJ-2040-07 (NCR Mode)
Addmaster	Addmaster IJ-3160-01
Addmaster	Addmaster IJ-6080 (Serial)
Addmaster	Addmaster IJ-6080 (USB)
Addmaster	Addmaster IJ-7102 (Serial)
Addmaster	Addmaster IJ-7102 (USB)
Addmaster	Addmaster IJ-7202 (Serial)
Addmaster	Addmaster IJ-7202 (USB)
Addmaster	Addmaster IJ-7202-3C (Ethernet)
AT&T GIS	AT&T GIS 5223
Axiohm	Axiohm 721 (A721-XQ)
Axiohm	Axiohm 794 (A794-2103)

Note 1: See Release Notes for special instructions.

Last Updated: 8/9/2018

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Device Support List

Printers (cont)

Manufacturer	Device
Axiohm	Axiohm A470
Axiohm	Axiohm A470E
Axiohm	Axiohm A475
Axiohm	Axiohm A758 Serial Port
Axiohm	Axiohm A758 ("Virtual Serial to USB")
Axiohm	Axiohm A760 Serial Port
Axiohm	Axiohm A760 ("Virtual Serial to USB")
Axiohm	Axiohm A795 Serial Port
Axiohm	Axiohm A795 ("Virtual Serial to USB")
BANQIT	BANQIT 6390
BANQIT	BANQIT BEN
BANQIT	BANQIT LB1x
BANQIT	BANQIT Model 1 (PTR)
BANQIT	LB1x
Burroughs	ReceiptNOW
Burroughs	ReceiptNOW Elite
Citizen CBM	iDP 3541 Receipt
Citizen CBM	iDP-3530 23 Column Receipt
Citizen CBM	iDP-3530 28 Column Receipt
Citizen CBM	CBM-231 Receipt (CBM/PPU 231)
Citizen CBM	CBM-606 Journal (CBM 606J)
Citizen CBM	CBM-606 Receipt (CBM 606R)
Citizen CBM	iDP-3541 Receipt
Citizen CBM	iDP-3530 23 Column Receipt
Citizen CBM	iDP-3530 28 Column Receipt
Citizen CBM	iDP-3530 40 Column Receipt
Citizen CBM	iDP-3535 23 Column Receipt
Citizen CBM	iDP-3535 28 Column Receipt
Citizen CBM	iDP-3535 40 Column Receipt
Compuprint	MDP40 B (Dual Serial)
Compuprint	SP40 plus (Olivetti PR2 emulation) (Serial only)
Craden	Craden DP6
Craden	Craden DP7
Craden	Craden DP8
Craden	Craden DP9 Serial Port
Craden	Craden DP9 ("Virtual Serial to USB")
Craden	Unisys 4565 Emulation
DH Technology (DHP)	DHP 4711
DH Technology (DHP)	DHP 4712
DH Technology (DHP)	DHP 4771
DH Technology (DHP)	DHP 4772
DH Technology (DHP)	DHP 4773
DH Technology (DHP)	DHP 4774

Device Support List

Printers (cont)

Manufacturer	Device
DSS/(Nexus Software Inc)	A470
DSS/(Nexus Software Inc)	A470e
DSS/(Nexus Software Inc)	Image Printer
Epson	FX-870 (via Windows)
Epson	LX-810
Epson	Epson PLQ-20 w/ PR2 emulation
Epson	Epson TM-H6000II
Epson	Epson TM-H6000II APD (USB / Ethernet)
Epson	Epson TM-H6000III
Epson	Epson TM-H6000III APD (USB / Ethernet)
Epson	Epson TM-H6000IV
Epson	Epson TM-H6000IV APD (USB / Ethernet)
Epson	Epson TM-H6000 w/ Endorsement Support
Epson	Epson TM-H6000 (Spooled) (Ethernet)
Epson	Epson TM-J9000 w/ Scanner and MICR support
Epson	Epson TM-T70II APD (USB / Ethernet)
Epson	Epson TM-T88III
Epson	Epson TM-T88III APD (USB)
Epson	Epson TM-T88IV
Epson	Epson TM-T88IV APD (USB / Ethernet)
Epson	Epson TM-T88V
Epson	Epson TM-T88V APD (USB / Ethernet)
Epson	Epson TM-U200B
Epson	Epson TM-U200D
Epson	Epson TM-U220B
Epson	Epson TM-U220B APD (USB)
Epson	Epson TM-U220D
Epson	Epson TM-U220D APD (USB)
Epson	Epson TM-U295
Epson	Epson TM-U295P
Epson	Epson TM-U325D
Epson	Epson TM-U325D APD (USB)
Epson	Epson TM-U325PD (Parallel)
Epson	Epson TM-U375
Epson	Epson TM-U375P
Epson	Epson TM-U675
Epson	Epson TM-U675 APD (USB)
Epson	Epson TM-U675P
Epson	TM-U950
Heng Yu	S128MTSC (PTR)
Hitachi	Hitachi BH-10
HP	All ColorJets (via Windows)
HP	All laser printers (via Windows)

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Device Support List

Printers (cont)

Manufacturer	Device
IBM	IBM 4610 SureMark (USB)
IBM	IBM 4009
IBM	IBM 4712
IBM	IBM 4722 (Model 1,2 and 3)
IBM	IBM 4770
IBM	IBM 4772 Model 1
IBM	IBM 9055-001
IBM	IBM 9068-A01 (4722 Emulation)
IBM	IBM 9068-S01 (9055 Emulation)
IBM	All Laser Printers
IBM/Lexmark	2380
IBM/Lexmark	2381
IBM/Lexmark	2390
IBM/Lexmark	2391
IBM/Lexmark	2490 (Series)
IBM/Lexmark	2500
IBM/Lexmark	All Laser Printers via Windows
ICL	ICL FDP20
ICL	ICL FDP24
Jarfalla	Jarafalla BP24 (4722 Emulation)
Lexmark	2390/2391 (Same as IBM/Lexmark)
Lexmark	2490 (Same as IBM/Lexmark)
Lexmark	2500 (via Windows Printer) (Same as IBM/Lexmark)
Lexmark	260d
MagTek	MagTek Maxi MICR Check Reader
MagTek	MagTek MICR Wedge
MagTek	MagTek Mini MICR Check Reader
MagTek	MagTek Min Wedge Check Reader
Nexus	Image Printer
NCR	NCR 5021
NCR	NCR 5223
NCR	NCR 7141
Olivetti	Olivetti 2845 (4722 Emulation)
Olivetti	Olivetti MB-2 adf (Serial/USB)
Olivetti	Olivetti PR2
Olivetti	Olivetti PR2 (Dual Serial Port)
Olivetti	Olivetti PR2E (Serial)
Olivetti	Olivetti PR2E (USB)
Olivetti	Olivetti PR2E (Dual Serial Port)
Olivetti	Olivetti PR2plus (Supports USB, Serial and Passbook)
Olivetti	Olivetti PR2plus (Supports MICR and Scanner functionality)
Olivetti	Olivetti PR4RT (Plug & Play USB)
Olivetti	Olivetti PR4RT(USB-> Virtual COM)

NEXUS SOFTWARE

Device Support List

Printers (cont)

Manufacturer	Device
Olivetti	Olivetti PR4RT (Serial)
Olivetti	Olivetti PR4RT (USB)
Olivetti	Olivetti PR4SR
Olivetti	Olivetti PR4RTC
Panini	Vision NeXt Receipt Printer
Pertech	Pertech 5300 (A470 Emulation)
Pertech	Pertech 5351 (Serial)
Pertech	Pertech 5351 (USB)
Pertech	Pertech 5354 (Serial)
Pertech	Pertech 5354 (USB)
Pertech	Pertech 5371 (Serial)
Pertech	Pertech 5371 (USB)
Pertech	Pertech 5374 (Serial)
Pertech	Pertech 5374 (USB)
Seac	Seac RD 1000 EL
Star Micronics	Star TSP100 (USB) via Windows (Serial and Ethernet)
Star Micronics	Star TSP600 (Serial and Ethernet)
Star Micronics	Star TSP700 (USB) via Windows (Serial and Ethernet)
Star Micronics	Star TSP800 (Ethernet)
Star Micronics	Star TSP1000 (Serial and Ethernet)
Topaz	Topaz Systems T-L462-HSB
Topaz	Topaz Systems T-L766-HSB
Topaz	Topaz Systems T-S261
TPG	TPG B780 (Serial)
TPG	TPG B780 (USB)
Transact	Transact BANKJet 1500 (Supports Serial & Virtual Serial to USB)
Transact	Transact BANKJet 2500
Transact	Transact POSJet 1500 (Supports Serial & Virtual Serial to USB)
UNISYS	Unisys EFP4272
UNISYS	Unisys 4565
UNISYS	Unisys 4600
UNISYS	Unisys 4605
UNISYS	Unisys EFP95 (EFP9500)
UNISYS	Unisys EFP9800
Wincor-Nixdorf	HPR 4915 USB
Wincor-Nixdorf	HPR 4915
Wincor-Nixdorf	HPR 4905 (with Journal)
Wincor-Nixdorf	HPR 4920 (Serial / USB)+C327
Wincor-Nixdorf	All Laser Printers via Windows

Device Support List

Signature Pads

Manufacturer	Device
Topaz	T-S261
Topaz	T-L462-HSB
Topaz	TS766 Signature Pad

Text Terminal Unit (TTU)

Manufacturer	Device
BANQIT	BANQUIT HHT
BANQIT	LK32 TTU
CAS	CAS K21
Hypercom	HFT106 TTU
Hypercom	P1100 TTU
Hypercom	P2100 TTU
Hypercom	Paysec101 TTU

Text Terminal Unit (TTU) (cont)

Manufacturer	Device
IMB	IBM 4779 (TTU)
Intellect	Intellect 7270 (TTU)
Keycorp	KeyCorp K21 TTU
Keycorp	KeyCorp K23 TTU
MagTek	IntelliPin RS-232 (TTU)
MagTek	MagTek Maxi MICR TTU

I am delighted to reiterate that the Sweden–U.S. Entrepreneurial Forum of 2006 was the best one we have done yet."

Randy Mitchell, United States Department of Commerce

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ESBRI's founder

Leif Lundblad started his first company at the age of seventeen. Since then he has started some ten companies and created thousands of jobs. He has over 300 patents within a wide range of areas. Leif Lundblad's companies and innovations can be found in business areas such as radio and television, excavators, blasting, gardening, facade washing, sky-lifts, back treatment tables, air-conditioned shoes, pancake machines, combustion engines and pharmaceuticals.

Leif Lundblad's biggest success is Inter Innovation, a world-leading manufacturer of note handling equipment. He is chairman of the board and the main owner of BANQIT, a company specialised in note handling equipment and software for banks.

Leif Lundblad is also a keen debater and a popular speaker with a special interest in the welfare of Swedish entrepreneurs and small businesses. To increase the knowledge and understanding for the needs of small businesses, he seized the opportunity to start a new research institute - ESBRI - in 1996.

Web TV

2011-11-29

Kretsloppsautomat ökar tryggheten

Statsrådet Mats Odell invigde i går Swedbanks nya Q-cashrouter (QCR), en så kallad kretsloppsautomat för minskad kontanthantering, vid bankkontoret på Hamngatan i Stockholm. Målet är att underlätta för både miljön och säkerheten.

Kontanthantering är ett växande problem för dagens samhälle – i Sverige beräknas kostnaden för hanteringen av kontanter uppgå till cirka 11 miljarder kronor per år. Ett stort antal dagliga transporter krävs för att fylla på uttagsautomater, tömma serviceboxar, hämta och lämna kontanter från kontor och butiker samt att transportera sedlar till och från landets kontantcentraler. Det som framför allt driver kostnaderna är all hantering av sedlar samt rånriskerna vid räkning, lagring, laddning av uttagsautomater och transporter av kontanter.

– Kontanthanteringen kostar samhället mycket pengar och riskerar att leda till otrygghet. Därför är det viktigt att vi alla tillsammans söker lösningar som minskar riskerna med kontanthanteringen. Ett bra exempel på det är den kontantautomat som invigs idag, säger Mats Odell.

QCR är en kretsloppsautomat för effektivare kontanthantering. En insättningsautomat för sedlar kombinerad med två uttagsautomater gör det möjligt för butiksägare att sätta in dagskassan och få en direkt kvittering på sitt bankkonto, samtidigt som andra bankkunder kan ta ut pengar i uttagsautomaterna.

QCR-automaten har utvecklats av Banqit, ett svenskt innovationsföretag inom kontanthantering.

– Med QCR-automater kan volymen och kostnaden för kontanter halveras då pengarna återanvänds flera gånger i det lokala systemet, vilket dels minskar risken för värdetransportrån men även risken för rån på de lokala bankkontoren. De minskade transporterna leder även till minskade koldioxidutsläpp, säger Leif Lundblad, vd på Banqit.

– Vi på Swedbank är stolta över att idag kunna inviga den nya kretsloppsautomaten, vilket ligger helt i linje med vår ambition att vara den ledande banken inom kontanthantering. Vi arbetar också aktivt med andra lösningar, då hanteringen av kontanter är dyr och påverkar både miljön och säkerheten vid våra kontor. Vi är övertygade om att den här satsningen, som vi för närvarande testar, ska göra vardagen för våra kunder och vår personal lite enklare, säger Kjell Hedman, chef Svensk bankrörelse, Swedbank.

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2020-12-31

SAMHÄLLE:

Invigning & Symposium
1997-06-05
esbri
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Kunglig invigning av ESBRI

I strålande sol och med närmare 300 inbjudna gäster invigde kung Carl XVI Gustaf ESBRI. Därefter arrangerades ett symposium på temat ”Att skapa tillväxt och nya jobb” där flera framstående forskare deltog, bland annat amerikanen David L. Birch som gjort sig känd för sin forskning om snabbväxande företag, så kallade gaseller.

ESBRIs VD Magnus Aronsson inledde med att hälsa alla välkomna varefter han lämnade över ordet till kung Carl Gustaf som i sitt invigningstal bland annat betonade entreprenörskapets ovärderliga betydelse för Sveriges välfärdsutveckling. Han tog också upp det faktum att svensk och internationell forskning visar att de flesta nya arbetstillfällen skapas i småföretag och att intresset för småföretag därmed ökar, liksom behovet av forskning:

- Tack vare en generös donation från en framgångsrik entreprenör kommer sådan verksamhet nu att kunna bedrivas inom det nya Institutet för Entreprenörskaps och Småföretagsforskning, som också är knutet till en professur i ämnet vid Stockholms universitet. Detta initiativ tyder på verklig företagsamhet. Det är min förhoppning att ESBRI kommer att utgöra en mötesplats för svenska och utländska forskare, vars inriktning väl svarar mot den tvärvetenskapliga karaktär som forskningen inom området entreprenörskap och småföretagsamhet måste ha.

- Med stort intresse kommer jag att följa den verksamhet som skall bedrivas här. Jag ser fram emot den utlovade kunskapsspridningen och ESBRIs deltagande i samhällsdebatten, där de sakliga argumenten aldrig kan bli för många avslutade kungen och förklarade sedan ESBRI för invigt.

Därpå förklarade han ESBRI invigt genom att knyta ihop två blågula band för att markera

samarbetet mellan akademin och näringslivet.

Även rektorn för Stockholms universitet, Gustaf Lindencrona gladdes över ESBRIs tillkomst: Att vi nu kan tillsätta en småföretagsprofessur är oerhört glädjande.

ESBRIs grundare och donator, entreprenören och uppfinnaren Leif Lundblad, talade om entreprenörskapets och småföretagandets legitimitet:
- Mitt mål är att det ska vara fint att vara entreprenör.

Det handlar om att enskilda individer måste få synas och de måste få chansen att lyckas. Målet med ESBRIs verksamhet är att öka kunskapen och förståelsen för entreprenörskapets och småföretagandets villkor och därmed skapa förutsättningar för fler tillväxtföretag och nya arbetstillfällen i Sverige.

Vid det efterföljande symposiet, som hade just temat att skapa tillväxt och nya jobb, betonade samtliga talare - småföretagsforskaren David L. Birch, professorerna Gunnar Eliasson, KTH, Carin Holmquist, Umeå, Bo Hedberg, Stockholm och Per Davidsson. Jönköping - behovet av förändrade attityder liksom behovet av förebilder för att företagen ska vilja växa.

David L. Birch menade att Sverige uppfyller alla de kriterier som amerikansk småföretagsforskning har funnit vara mest betydelsefulla för att skapa tillväxt - alla utom en - entreprenörsklimatet måste förbättras.
När Birch studerade de tio städer i USA som har störst tillväxt fann han att samtliga hade universitet, flygplats, var trevliga att bo i och att de hade bra entreprenörsklimat.

- Sverige har fler universitet per capita än USA, genom Öresundsbron får ni tillgång till ytterligare en världsflygplats och Sverige är ett av de vackraste länderna i världen, återstår alltså en punkt: vilken inställning har ni till entreprenörerna? Ni har varit mycket entreprenöriella i historiskt perspektiv, men är ni tillräckligt stolta över era entreprenörer idag? Visst kan ni sänka skatter och förenkla regler, det har ni också gjort, men det har inte gett den tillväxt ni hoppades på. USA kan lära mycket av Sverige och ni kan lära av oss vad gäller attityden gentemot entreprenörer. Det är därför tillkomsten av ESBRI är så viktig. Det kan utgöra en mötesplats för erfarenhetsutbyte om entreprenörskap.

Per Davidsson som forskat i tillväxtens psykologi har kommit fram till att förebilder har mycket stor betydelse för företagens tillväxt. Där det finns många företag är benägenheten att starta företag större, likaså för dem som har företagare nära inpå sig - i släkten till exempel.

- De flesta företag är och förblir väldigt små. Alla vet att det finns 400 000 - 500 000 företag. Om de anställde 10 personer skulle det ge 4 miljoner jobb. Men det är bara en miljon som arbetar i småföretagen. Bristen på tillväxt är inte nödvändigtvis ett problem för företagen, utan kanske mer ett samhällsproblem, sa Per Davidsson.

Gunnar Eliasson menade att det svenska lagomsyndromet gör att det kanske finns för många förebilder av det slaget att man nöjer sig med en viss storlek på företaget.

Text: Iréne Forsmark

27/12-10 - Press releases

Share the news

New 'Super ATMs' Can Halve Cash in Circulation

Real market results from a major Swedish bank show that BANQIT's new revolutionary local cash recycling machine, the QCR, leads to highly satisfied customers and massive savings in notes in circulation and corresponding costs for cash handling. The QCR is a Â'super ATM' that receives deposits from retailers and within a few seconds dispenses the same notes to bank customers, in effect shortcircuiting the traditional extensive and expensive cash handling loop.

Results from a real life proof-of-concept installation of a Q-Cash Router (QCR) lasting 12 months at Swedbank's headquarter in central Stockholm, Sweden, have just been compiled and analyzed. The results show that Swedbank (one of Sweden's four major banks with 19 000 employees and assets totalling EUR 196 billion) was able to reduce the need for transports of notes to and from the branch by EUR 490,000 worth of notes per week, equivalent to EUR 25 million worth of notes per year, by using only one single QCR machine.

A survey also shows that Swedbank's retail customers using the new QCR were highly satisfied with the functionality of the QCR; It was regarded as user friendly, reliable, informative, and with a good capacity to deposit cash swiftly and to receive cash without queues.

Â"The results indicate that it is possible to reduce the amount of cash being unnecessarily transported and counted by banks, CIT companies and cash depots by up to 50 per cent, in Sweden or in any other country in the world", said Leif Lundblad, CEO and owner of BANQIT, the developer and manufacturer of QCR.

Massive potential savings of cash handling costs around the world

The total cost of handling cash is estimated at SEK 11 billion (EUR 1.2 billion) annually in Sweden, at EUR 50-70 billion per year in the European Union, and at USD 60 billion per year in the USA. The costs correspond to 0.4-0.6 per cent of annual GDP's, of which a very large portion could be saved by using local recycling machines such as the QCR. The main costs are the actual manual handling of cash, transport of cash between shops, banks and cash depots, and the risks for robberies.

Â"Today's ATMs are ancient machines that should be replaced. It is almost bizarre to transport and count all the cash that is deposited so many times in the loop when the customers could withdraw the same cash in the same machine just a few meters away, and just a few seconds later. Cash handling amounts to up to 10-20 per cent of an average retail bank's total costs, so there are massive savings to be done for both banks and the society at large", said Leif Lundblad.

Despite strong efforts by banks and card companies to entice people to use cards instead of cash, people still prefer cash for many reasons, and the fact is that cash in circulation is increasing globally, not decreasing.

That can only change by Â"shortcircuiting" the unnecessary and expensive cash handling loop and use modern cash recycling machines like the QCR that can both accept and immediately dispense cash without the need for the cash to be transported to cash depots and central banks for counting etc.

Mr. Leif Lundblad – the serial cash handling solutions entrepreneur

Leif Lundblad is a serial entrepreneur and the man who in the 70's invented cash dispensing technologies that are now used in ATM's and teller-assisted units all over the world. The QCR is the result of ten years of inventions and product development and is protected by more than 90 patents.

Cash deposited by retailers in the QCR is credited to their accounts immediately. All the notes are automatically counted, sorted and controllled. Counterfeit detected, unfit, dyed and suspect notes are separated and retained. The QCR can through its unique design with multiple interfaces (so-called fascias) simultaneously process up to 10 withdrawals and one deposit in four minutes. The QCR is the only cash recycling machine on the market that can simultaneously service three people with deposit and withdrawals.

Another unique and patented feature of the QCR is the use of SealPacks: heat-sealed, tamper-proof plastic enclosures with the content labelled in clear text and barcoded. This eliminates the time and costs associated with transporting banknotes to cash centres for processing and then back to ATMs via standard cash cassettes.

The QCR differentiates itself from other traditional ATMs and recycling machines (which only have one customer fascia) by having four customer fascias which can be operated simultaneously for deposits and withdrawals. This makes the QCR the only solution available in the market enabling real efficient local recycling of cash with a possible 50 per cent reduction of the costs for manual cash handling and transportation of cash.

Central banks all over the world have lately been trying to push commercial banks to take responsability for reducing cash in circulation due to the high costs and risks associated with cash handling, and are in general in favour of cash recycling solutions.

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About BANQIT

BANQIT develops, manufactures and market solutions for cash handling, including local cash recycling. BANQIT offers innovative systems based on advanced technology to retail banks, cash-in-transit companies (CITs) and retailers.

The Q-CashRouter (QCR) - BANQIT´s new product line, enables automated and efficient local recycling of cash and reduces the need for manual handling and transporting of cash, with considerable cost savings for retail banks, retailers and CIT companies. It is a self service unit allowing banknotes that are deposited in the QCR to be reused immediately for withdrawals, including automated counting, sorting, quality control, counterfeit and ink-dye detection as well as automated banknote packaging in SealPacks.

Fewer transports will reduce costs in society, increase security and benefit the environment.

Mr. Leif Lundblad is the inventor of the Q-CashRouter and the owner of BANQIT. Mr. Lundblad has invented many of the modern cash dispensing technologies used in TAUs and ATMs. BANQIT's present operations started in 1999. BANQIT is based in Kista just north of Stockholm, Sweden. Leif Lundblad is BANQIT's CEO.

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Pressmeddelande (First North: WINT)

FÖR OMEDELBAR PUBLICERING
09:00, 2011-05-20

BANQIT lägger order om 1,3 MSEK hos West International

West International har erhållit en order från BANQIT Self Service Products AB på skrivarsystem för bankomater. Affären är en del i ett pågående leveransprojekt till slutkund. Ordervärdet uppgår till knappt 1,3 MSEK.

För ytterligare information kontakta:

Sten Karlsson, VD West International AB
Mobil: 070-555 6065

Om West International AB (publ):

West International levererar smarta transaktions- och betalningslösningar inom butik, hotell och restaurang, samt retail banking. Bland företagets erbjudanden finns kassasystem, kontanthanteringslösningar, självbetjäningskiosker och andra produkter som alla syftar till att effektivisera våra kunders betalningsflöden för sina konsumenter. Försäljning sker dels via systemintegratörer och distributörer, men också direkt till slutkund. Bland kunder och användare återfinns exempelvis Schenker, EG Gruppen, Fujitsu, HP, Volvo, H&M, McDonald's, Citibank och Absa Bank. Bolaget har säte i Stockholm och är listat på Nasdaq OMX First North. Bolagets Certified Adviser är Thenberg & Kinde Fondkommission AB, 031-7455000. Se även www.westint.se

500
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2006-07-25

Säker kontanthatntering

Att värdetransporter blir allt mer utsatta för rån har väl inte undgått någon. Därför är det inte så konstigt att allt fler lösningar som eliminerar bemannade transporter presenteras. BANQIT AB är ett bolag som har lanserat sin problemlösning när det gäller penningtransporter för butiksägare. Med produkten Q-Cash Router får användarna en insättningsmarkin kombinerat med två bankomater.

SÅ här fungerar det. Samtidigt som butiksägarna sätter in sina dagskassor ochj får dom noterade på på sina konton kan kunder ta ut i princip samma pengar i bankomaterna. Så länge pengaströmmarna ungefär motsvarar varandra behövs ingen påfyllning eller tömning av systemet. Därmed kan t ex ett köpcenter hållas försörjd med kontanter. Volymen sedlar i ett system kan dessutom hållas nera jämfört med vad som finns som mest i en bankomat.
Pengatransporterna kan i princip begränsas till defekta eller oäkta sedlar som systemet sorterar ut och paketerar och som sedan skickas in till Riksbanken. Tanken är att systemet i första hand ska sitta i affärscentra och motsvarande.
Så länge pengaströmmarna ungefär motsvarar varandra behövs ingen påfyllning eller tömning av systemet. På det sättet kan ett affärscentra, en citykärna eller motsvarande hållas försörjd med kontanter. Volymen sedlar i ett system kan dessutom hållas nera jämfört med vad som finns som mest i en bankomat.
Pengatransporterna kan i princip begränsa till defekta eller oäkta sedlar som systemet sorterar ut och paketerar och som sedan skickas in till Riksbanken. Tanken är att systemet i första hand ska sitta i affärscentra och motsvarande.
-Det här är ett paradigmskifte. Ingen har tänkt på det här sättet tidigare. Den senaste tidens rån har visat problemen med pengatransporterna och vad det kostar att flytta runt pengar, säger Leif Lundblad till nyhetesbyrån TT.
Dagens kontanthantering kostar i storleksordningen 11 miljarder kronor. Med mellan 3|000 och 4|000 installerade system till en kostnad på mellan 4 och 5 miljarder skulle den kostnaden kunna halveras, bedömer Lundblad.
Hittills har 70 system installerats hos livsmedels- och varuhuskedjan Carrefour i Spanien. I Sverige har det gått trögare. Men i slutet av månaden ska ett system installeras i köpcentrat Kupolen i Borlänge.
-Det har inte varit läge förrän bankerna nu fått kravet på sig att ta hand om kontanthanteringen. Vi har nyss kommit i produktion men skulle kunna ha 100 maskiner ute i mitten av nästa år, säger Lundblad.
Systemet kallas The Q-Cash Router (QCR) och har enligt Lundblad ännu inget svenskt namn. Till finesserna hör att den som stoppat in en falsk sedel blir fotograferad. Särskilt skydd i form av en liten kiosk finns för de som sätter in pengar.

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FÖRETAGSNYHETER:

Västra Götalandsregionen utsatt för cyberattack

Attacken mot regionen har pågått i två veckor.– Vi... **Läs mer »**

2020-12-30

FÖRETAGSNYHETER:

ANNONS

Industri

Sedlarna håller än

Eva Ekelöf

PUBLICERAD 25 APR 2001 KL 13.00

ANNONS

Betalkorten till trots så säljs sedelutmatare som aldrig förr. Sveriges enda tillverkare av automatiska sedelutmatare ökar tillverkningen dramatiskt i Flen och Eskilstuna, från 25 000 enheter förra året till 40 000 enheter år 2002.

Över 90 procent av tillverkningen går på export.

- Omsättningen för De La Rue Cash Systems AB ökar, men inte lika kraftigt som produktionen, säger Kevin Bond, ansvarig för affärsområdet i De La Rue Cash Systems.

Det svenska företaget är ettdotterbolag till brittiska De La Rue Plc vars kärnverksamhet är just sedeltillverkning och automatisk sedelhantering. De La Rue tillverkar sedlar åt över hundra länder och säljer utrustning för sedelhantering i hela världen. Den brittiska koncernen räknar definitivt med en fortsatt ökning av antalet sedlar i världen och att kontanthandeln inte ersätts av betalkort, internetbanker och andra elektroniska lösningar.

- Såväl våra egna utredningar som utredningar gjorda av oberoende organisationer visar att kontanter förblir populära och användningen i världen förväntas inte minska påtagligt, säger Kevin Bond.

Det brittiska företaget hänvisar till undersökningar bland annat i Storbritannien och hävdar att den utveckling som tagit fart i Sverige de senaste åren inte är representativ för utvecklingen i resten av världen.

Från den svenska branschorganisationen Svensk Handel kommer nämligen uppgifter som definitivt innebär att sedlarna nu snabbt tappar mark inom den svenska detaljhandeln. Betalkortens andel växer med så mycket som 25 procent

Men varken det brittiska företaget De La Rue eller den svenska bankomattillverkaren Banqit AB räknar med att den svenska trenden skall få snabb spridning i omvärlden.

- Jag tror inte att sedelhanteringen i världen kommer att minska. Volymen kommer att vara kvar de närmaste tio till tjugo åren. Människor vill inte ändra sina vanor, säger den välkände entreprenören Leif Lundblad, som idag är huvudägare i Banqit.

- Det gäller att sänka bankernas kostnader för sedelhanteringen, säger Leif Lundblad som ser en mycket stor global marknad för produkter som automatiserar sedelhanteringen.

De La Rue Cash System AB baserar faktiskt sin verksamhet på en innovation som gjordes av Leif Lundblad på 1970-talet. Hans företag Inter Innovation AB var då bland de första i världen med en säker automatisk sedelutmatare. Inter Innovation hade cirka 300 patent och konstruktionen var så bra att Inter Innovation nådde miljardomsättning innan det brittiska företaget De La Rue Plc köpte verksamheten 1992.

För några år sedan blev Leif Lundblad huvudägare i det Stockholmsbaserade företaget Banqit AB som säljer bankomater för cirka 200 miljoner kronor per år, allt går på export idag. Banqit köper också sin sedelutmatare från Flen.

Det finns två grundläggande tekniker för automatiska sedelutmatare. Den ena baseras på vakuummatning, en sugmekanism som tar den enskilda sedeln. Den andra kallas friktionsmekanism. Och det är sådana som tillverkas i Flen.

Så här fungerar tekniken.

Bankomatanvändaren begär ett uttag på femtonhundra kronor. Ett kommando skickas till en programvara som styr utmataren. I programmet finns redan en mall för hur många sedlar som skall matas ut och i vilka valörer för olika bruttobelopp.

Sedlarna lagras i ett magasin och mot sedelbunten trycks en excentrisk rulle. När kommandot kommer trycker en motor rullen mot sedelbunten sakta, sakta uppåt. Efter ett tag så kommer den excentriska rullen att greppa tag i sedlarna och börja flytta dem och till slut så kommer sedlarna fram till ett rullpar. Sedlarna

den att påverkas av två krafter. En kraft som är stor som säger "fortsatt i den riktningen du har" och en liten kraft som säger "stanna kvar".

Är det en sedel så vinnerden stora kraften och sedeln går ut. Om det däremot är två sedlar påverkas den ena sedeln som går emot den stora rullen, den påverkas av en stor kraft så att den ska gå framåt. Den andra sedeln påverkas av den motroterande rullen att stanna kvar och på det viset säras sedlarna. Det hela förutsätter att friktionskraften mellan sedlarna är lägre än vad kraften mellan sedel och rulle är. När den första sedeln har passerat upprepas förloppet och nästa sedel matas fram. Därefter passerar sedlarna sensorer som kontrollerar att det verkligen är rätt antal. Sensorerna mäter sedlarnas tjocklek. Denna mekanism är så säker att De La Rue hittills aldrig fått ett besked om att utmatningsmekanismen gjort något fel.

Den mekanik som nyttjas i sedelutmataren styrs av mikroprocessorer. Enligt Leif Lundblad var Inter Innovation AB först i världen med sådan programvarustyrning. Detta innebär också att De La Rue Cash Systems genom att utveckla ny programvara kan förbättra enskilda funktioner. Bankomatens sedelutmatare kan kontinuerligt uppdateras med ny programvara.

Efter 1992 utvecklade konstruktörernai Flen en ny generation sedelutmatare som baserades på den ursprungliga konstruktionen, både ny mekanik och ny programvara utvecklades. Konstruktörerna behövde 150 till 200 manår innan de nya produkterna var klara och nu är det dessa som genererar ökad försäljning. En mindre grupp i Flen underhåller och utvecklar kontinuerligt ny programvara.

- Programvaran till sedelmatningsmekanismen är avancerad och av central betydelse. Det är vår programvara som ger oss en fortsatt stark ställning på världsmarknaden, säger Håkan Persson, platschef för De La Rue Cash Systems AB.

Den svenskutvecklade mekanismenklarar dessutom sedlar från alla länder i hela världen. Sedelkvaliteten varierar kraftigt, olika slag av papper används och några länder använder plastsedlar, till exempel Thailand. Tack vare programvarustyrningen kan sedelutmataren automatiskt ställa in sig själv och ta hänsyn till förslitning och olika sedeltyper.

Företaget säljer nu fyra olika produkter. Den första produkten är en automatisk sedelhanterare, så kallad Teller Cash Dispenser (TCD) som ger bankkassörskan

NMD100 och NMD50 används i traditionella bankomater och utvecklades på 1990-talet.

Den senaste produkten är Minimek som lanserades hösten år 2000. Den används i en ny typ av enklare bankomater som kan placeras till exempel i butiker. Det finns ett uppenbart intresse av att erbjuda kontanter i lokala butiker.

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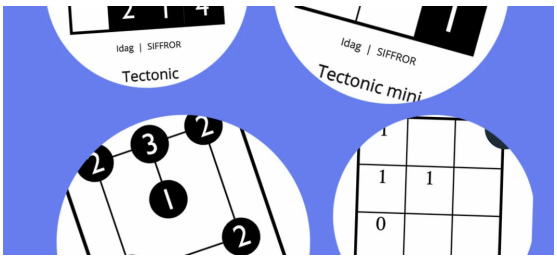

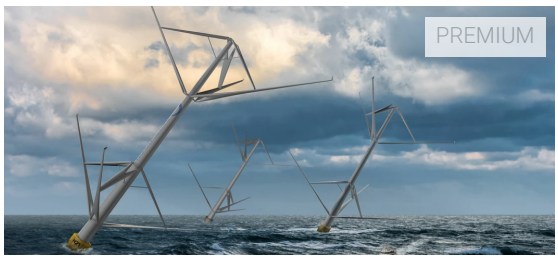

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09/25/2012

Successful integration: BANQIT presents cash recycling system with innovative banknote storage concept from Wincor Nixdorf

(PresseBox) (Paderborn, 09/25/2012) At Wincor World 2012 (Rheda-Wiedenbrück, September 16 to 18, 2012), BANQIT AB, a provider of cash handling solutions, is presenting the company's first cash recycling system, the Q-CashRouter, with integrated banknote storage technology from Wincor Nixdorf. That makes BANQIT the second provider to be presenting the use of intelligent cassettes from Wincor Nixdorf in its systems. In 2011, the Munich-based technology group Giesecke und Devrient had already presented a processing system that processes CINEO cassettes. BANQIT AB and Wincor Nixdorf signed a cooperation agreement just at the start of 2012 that allows the Swedish company to adapt Wincor Nixdorf's Cash Cycle Management Solutions concept.

The advantage of the Cash Cycle Management Solutions concept is that the cash cassettes in Wincor Nixdorf's CINEO system generation can be exchanged between ATMs, cash recycling systems and automated teller safes. "Integrating the intelligent CINEO cassette technology from Wincor Nixdorf into the Q-CashRouter provides banks with decisive benefits such as lower cash handling costs, improved processes and greater security," said Leif Lundblad, CEO and founder of BANQIT AB.

"The successful cooperation with BANQIT shows that, together with another manufacturer, we have come a huge step closer to fulfilling the demand for standardization from the banks and central banks and hence paved the way for process optimizations in cash handling," explains Uwe Krause, Vice President Banking at Wincor Nixdorf.

CINEO is the innovative system generation from Wincor Nixdorf. It comprises ATMs, cash recycling systems, automated teller safes and transaction terminals. It is part of Wincor Nixdorf's Cash Cycle Management Solution concept. CINEO systems set standards in terms of processing speed, security and serviceability.

About BANQIT:

BANQIT develops, manufactures and markets self-service equipment including "high-end" cash recirculation solutions to retail banks, retailers and CiT companies. BANQIT is based in Kista, Sweden. Mr. Leif Lundblad is the owner and CEO of the company (www.banqit.com).

This document contains forward-looking statements that are based on current estimates and assumptions made by the management of Wincor Nixdorf AG to the best of its knowledge. Such forward-looking statements are subject to risks and uncertainties, the non-occurrence or occurrence of which could cause the actual results - including the financial condition and profitability of Wincor Nixdorf - to differ materially from or be more negative than those expressed or implied by such forward-looking statements. This also applies to the forward-looking estimates and forecasts derived from third-party studies. Consequently, neither the Company nor its management can give any assurance regarding the future accuracy of the opinions set forth in this document or the actual occurrence of the predicted developments.

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2009-10-28 09:16 CET

Swedbank inviger kretsloppsautomat för minskad kontanthantering

Statsrådet Mats Odell inviger idag, den 28 oktober, kl. 11.00 Swedbanks nya Q-CashRouter (QCR), en så kallad kretsloppsautomat för minskad kontanthantering, vid bankkontoret på Hamngatan, Stockholm. Vid invigningen kommer även Kjell Hedman, Chef för Svensk Bankrörelse, Swedbank, samt Leif Lundblad, VD på BANQIT samt skapare av QCR-automaten, att närvara.

Kontanthantering är ett växande problem för dagens samhälle - i Sverige beräknas kostnaden för hanteringen av kontanter uppgå till cirka 11 miljarder kronor per år. Ett stort antal dagliga transporter krävs för att fylla på uttagsautomater, tömma serviceboxar, hämta och lämna kontanter från kontor och butiker samt att transportera sedlar till och från landets kontantcentraler. Det som framför allt driver kostnaderna är all hantering av sedlar samt rånriskerna vid räkning, lagring, laddning av uttagsautomater och transporter av kontanter.

- Kontanthanteringen kostar samhället mycket pengar och riskerar att leda till otrygghet. Därför är det viktigt att vi alla tillsammans söker lösningar som minskar riskerna med kontanthanteringen. Ett bra exempel på det är den kontantautomat som invigs idag, säger Mats Odell.

QCR är en kretsloppsautomat för effektivare kontanthantering. En insättningsautomat för sedlar kombinerad med två uttagsautomater gör det möjligt för butiksägare att sätta in dagskassan och få en direkt kvittering på sitt bankkonto, samtidigt som andra bankkunder kan ta ut pengar i uttagsautomaterna.

QCR-automaten har utvecklats av BANQIT, ett svenskt innovationsföretag inom kontanthantering. Svensk teknik ligger långt framme inom detta område, BANQIT har som första företag i världen utvecklat en detektor för att läsa av färgade sedlar som varit med om rån. Sedlar som misstänks vara oäkta eller färgade identifieras och fångas upp lokalt samt registreras automatiskt. QCR-automaten testas för närvarande av Swedbank

- Med QCR-automater kan volymen och kostnaden för kontanter halveras då pengarna återanvänds flera gånger i det lokala systemet, vilket dels minskar risken för värdetransportrån men även risken för rån på de lokala bankkontoren. De minskade transporterna leder även till minskade koldioxidutsläpp, säger Leif Lundblad, VD på BANQIT.

- Vi på Swedbank är stolta över att idag kunna inviga den nya kretsloppsautomaten, vilket ligger helt i linje med vår ambition att vara den ledande banken inom kontanthantering. Vi arbetar också aktivt med andra lösningar, då hanteringen av kontanter är dyr och påverkar både miljön och säkerheten vid våra kontor. Vi är övertygade om att den här satsningen, som vi för närvarande testar, ska göra vardagen för våra kunder och vår personal lite enklare, säger Kjell Hedman, Chef Svensk bankrörelse, Swedbank.

För ytterligare information:
Mia Widell, Pressekreterare hos kommun- och finansmarknadsminister Mats Odell, Finansdepartementet, tfn: 08-405 17 21
Peter Borsos, Kommunikationschef Svensk bankrörelse, Swedbank, tfn: 070-317 68 00
Leif Lundblad, VD, BANQIT, tfn: 070-864 64 46

För mer information om QCR-automaten se: www.banqit.com

Swedbanks vision är att vara den ledande finansiella institutionen på de marknader vi är verksamma. Swedbank har totalt ca 9,4 miljoner privatkunder och ca 600 000 företagskunder med 419 kontor i Sverige, 278 kontor i de baltiska länderna samt 215 kontor i Ukraina. Koncernen har även verksamhet i

Helsingfors, Kaliningrad, Köpenhamn, Luxemburg, Moskva, New York, Oslo, Shanghai, S:t Petersburg och Tokyo. År 2008 uppgick balansomslutningen till 1 812 miljarder kronor och antalet anställda var cirka 21 000. Läs mer om Swedbank på www.swedbank.se.

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JUSTIA

METHOD FOR A BANKNOTE DETECTOR DEVICE, AND A BANKNOTE DETECTOR DEVICE

Apr 20, 2010 - BANQIT AB

A banknote detector device for an automatic teller machine, for differentiating between non-accepted and accepted banknotes, includes a banknote image sensor to receive and scan at least one face of an input banknote and to store a banknote image (BI) of each scanned. The image

includes image data in the form of a number of pixels; and a reference banknote image (RBI) storage where one reference banknote image, being processed from a predetermined number of banknote images from accepted banknotes, is stored for each face of each banknote. The device includes an alignment, a banknote face classification unit, a printed pattern positioning unit and a comparison unit where, for at least one face of the banknote, the BI and RBI, being in exact pattern position in relation to each other, are compared pixel per pixel according to a predefined comparison procedure to classify the banknote as accepted or non-accepted.

Latest BANQIT AB Patents:

- Method for a banknote detector device, and a banknote detector device

Skip to: Description · Claims · Patent History · Patent History

Description

FIELD OF THE INVENTION

The present invention relates to a method and a device according to the preambles of the independent claims.

The present invention is pertinent as to arts and devices for checking and determining authenticity, value and unfitness (decay) degree of banknotes, and in particular to banknote handling machines, or automatic teller machines (ATMs), to search for and to find counterfeit banknote or banknotes being ink dyed as a result of non-authorized opening of a cassette provided with an ink dyeing ampoule.

BACKGROUND OF THE INVENTION

In spite of numerous predictions of a cashless society, the amount of cash in circulation has not declined. There are today an estimated 360 billion transactions in the EU every year to be compared with 60 billion non-cash transactions. The handling of cash is a very cost consuming operation still involving a lot of manual handling and transportation to and from consumers, retailers, banks, cash centres and National banks. The cash is counted on numerous occasions during this circulation and the security problems are extensive. The annual cost for handling of cash in the European Union is around 50 billion Euro.

Conventional banknote sorting and counting devices are designed for automatic processing of banknotes of any issue, value and country. The process on which the operation of the device is based consists of determining authenticity, denomination and decay level of a banknote using full images—obtained with scanning devices—of both banknote sides inter alia in the visible spectral range and in the infrared spectral range. The images are transmitted to and processed in a computing unit where obtained images are compared to reference images with the help of preinstalled pattern recognition software.

A number of different measures have been taken in order to secure banknotes against counterfeits, e.g. by printing pictures on banknotes with so-called metameric inks; these pictures cannot be seen with a naked eye and only reveal themselves in the infrared spectrum. Knowing a concrete infrared image, it is possible to develop a detector that checks several certain points on the banknote surface for availability or absence of metameric ink.

EP-1160737 relates to a method for determining the authenticity, the value and the decay level of banknotes, and a sorting and counting device.

WO-95/24691 relates to a method and apparatus for discriminating and counting documents that inter alia comprises a memory that stores master characteristic

patterns corresponding to associated predetermined surfaces of a plurality of denomination s of genuine bills.

GB-2199173 relates to a bill discriminating device adapted to carry out an operation by extracting data from only a characteristic region of a bill.

The inventors to the present invention have identified a need of improved detection capabilities regarding banknotes being ink dyed as a result of robbery.

SUMMARY OF THE INVENTION

The above-mentioned object is achieved by the present invention according to the independent claims.

Preferred embodiments are set forth in the dependent claims.

Thus, according to the present invention a method and a device are arranged in order to improve the capabilities of detecting ink-dyed banknotes.

In Short the Method Comprises:

A) an alignment step where one side of the banknote image is aligned, by use of a stored IR-image of the input banknote, in relation to the respective side of a reference banknote image (RBI), and that the banknote size is determined,
B) a banknote face classification step is performed to determine face and orientation of the banknote image,
C) a printed pattern positioning step where the printed pattern of the banknote image (BI) is determined in order to exactly position the BI printed pattern in relation to the printed pattern of a reference banknote image (RBI),
D) a comparison step where, for at least one face of the banknote, the BI and RBI, being in exact pattern position in relation to each other, are compared pixel per pixel according to a predefined comparison procedure resulting in that the input banknote is classified as accepted or non-accepted.

The present invention will now be described in detail with references to the appended drawings

SHORT DESCRIPTION OF THE APPENDED DRAWINGS

FIG. 1 is a flow diagram illustrating the present invention.

FIG. 2 is a block diagram illustrating an embodiment of the present invention.

FIG. 3 is another flow diagram illustrating the present invention.

FIG. 4 shows a raw image of a robbery ink coloured banknote, before any processing is made on the image.

FIG. 5 is an IR-image of the banknote prior the skewing procedure.

FIG. 6 shows an IR-image of the banknote inbound in a rectangle determined in the skewing procedure.

FIG. 7 shows four different images of one banknote, the front side, back side (upper row) and each side rotated 180 degrees (lower row).

FIG. 8 illustrates the step of locating the pattern position.

FIG. 9 shows a zoomed in detail of a matched pattern position during the matching step.

FIG. 10 illustrates a reference image created by calculating the mean-value of the pixels of each pixel position from typically 200 street quality banknotes.

FIG. 11 shows a street quality processed reference banknote image.

FIG. 12 shows masked out and not detected region of a banknote.

FIG. 13 illustrates an image pixel grid.

FIG. 14 is a non-grey colours diagram, although shown in a grey-scale where cyan, yellow and magenta are indicated.

FIG. 15 is a dirt-colours diagram.

FIG. 16 is a high-gain colours diagram.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

The banknote detector device according to the present invention may be arranged as a separate module of a standard ATM, or may be implemented as an integral part, using the available image detectors, of a standard ATM. As indicated above the banknote detector according to the present invention is suited, in particular, to detect, identity and sort-out ink-dyed banknotes. The banknote detector device may be used in conjunction with other detector devices that are specifically dedicated for detection of false banknotes. It should be noted that the detector device according to the present invention, if being properly set-up, also may be used in that regard.

With references to FIG. 2 the detection is performed by a banknote image sensor, that preferably comprises two physical detector-units, one detector for each side of the banknote. If any of the detectors detect a dyed face, the note is considered as dyed. The banknote handling device comprises the banknote image sensor, preferably an infrared (IR) image sensor and an image processor. The image processor includes, in its turn, a storage, a reference banknote image (RBI) storage, an alignment unit, a banknote face classification unit, a positioning unit, and a comparison unit. The IR-image of the banknote is stored in the storage such that the IR-image being linked to the corresponding banknote image. As will be discussed below the IR image sensor may be obviated. Also the banknote alignment and banknote classification may be performed by other means, but these units are nevertheless included in FIG. 2 as the results of the corresponding method steps are necessary requirements for the steps C and D, as will become clear from the following description.

The image processor receives, from the detectors, image signals representing the detected images, and the image processor then processes the image signals.

A banknote image comprises one infrared (IR)-layer and layers for each RBG (Red, Blue, Green) colour, i.e. totals 4 layers. The IR-layer resolution is preferably 864×300 pixels, while each RGB layers are squared symmetric pixels with a resolution of 432×300 pixels. However, the IR-layer is addressed and effectively used only by squared symmetric 432×300 pixels in order to simplify the algorithm. Each symmetric pixel represents 0.5×0.5 mm. All pixels have a value 0-255 where 0 is the darkest. When processing the banknote image according to the algorithm the colour image layers are read and counted as inverted CMY (Cyan, Magenta, Yellow) where 255 is the darkest. CMY is used to define logical values of the amount of colour-print on white paper. It should be noted that the present invention is equally applicable if RBG is used instead for processing purposes.

The RGB-image of the banknote is preferably obtained by a Colour Contact Image Sensor, a CIS-sensor.

According to one embodiment the banknote is at a distance of max 1 mm from the CIS-sensor in order to be able to pull the banknote pass the sensors.

In another embodiment the banknote is mechanically moved passed the CIS-sensor and pressed towards the sensor. More accurate measurements are then obtained and e.g. the IR-sensor may be obviated.

The illustration in FIG. 4 shows a raw image of the front side of a robbery ink coloured banknote, before any processing is made on the image. In this case a Swedish **100** crown banknote.

The method according to the present invention, comprising steps A, B, C and D, will now be described with references to the FIGS. 1, **3** and **4-15**.

A—Alignment Step

The purpose of this step is to align the scanned banknote in order to determine the size of the banknote. This is preferably performed by a so-called “squeezing method” which is schematically illustrated in FIG. 5 that shows an IR-image of a non-aligned banknote. In the aligning step the IR banknote image, being a dark rectangle, preferably is used. According to an alternative embodiment the alignment instead is performed using the banknote image obtained by the banknote image sensor.

The angle between the dark rectangle, the banknote image, and a horizontal line is determined, and the banknote image is then iteratively rotated until the banknote image is in a horizontal position, i.e. the longer side is horizontal. It should be noted that any side of the banknote could be used in when performing the alignment. The orientation of this side is then compared to the orientation of the respective side of the reference banknote image. During the iteration the first rotation of the banknote image is rather big, the next rotation is e.g. half the first rotation, etc.

It should be noted that the aligning step is preformed on all detected banknotes.

This step of the procedure is to orientate, or align, the banknote image in a predefined position, e.g. horizontally, which is a presumption when performing the subsequent steps.

According to this step, the angle of a rectangular or approximated rectangular banknote image document is determined by identifying the skew-angle where the document vertical height is minimum.

Thus, for this purpose the IR-image is used. The quality of the IR-image must be such that it does not indicate any dark pixels outside the document. A threshold is used to indicate dark pixels. During the alignment step different skew-angles are tried out and the height is measured until the angle resulting in the minimum height is found.

For practical reasons related to the used programming technique the image-data is never moved when the angle-skew is performed, but instead the read-process does perform an angle-skew x-y-coordinate recounting according to a preset angle. Referring to FIG. 5, showing an IR-image of the banknote prior the skewing procedure, the height is measured in this clockwise skew as y1p-y0n. An approximated correction angle is calculated by use of all four points y0n, y0p, y1n, y1p. After correction of the angle the process is repeated using the new correction.

When the difference ((y1p-y0n)−(y1n-y0p)) are small, called “level-I” (i.e. the angle is small) the correction is only ½ of the approximated calculated value. When even smaller difference, called “level-II”, the correction is only ¼ of approximated calculated value. This is to ensure that the best fit angle is not missed. The last level-II is repeated until no more changes in height can be determined.

When the skew instead is counter clockwise, the same, but mirrored, calculation is performed.

When the angle determination is ready, the corners position in the image are determined as the smallest rectangle where all the document's IR-pixels can be inbound. This is illustrated in FIG. 6 that shows the IR-image of the banknote inbound in a rectangle determined by the skewing procedure.

The corner positions are stored in the storage arranged in connection with the image processor together with the skew-angle.

After this process the document's pixels are read as in FIG. 6 by processing the skew-angle and document position left-top as x-y-coordinate 0,0.

According to an alternative embodiment the position and the size of BI is determined by instead identifying the position of the banknote corners and the

angle to a horizontal line and by trigonometrical calculations determine the size and position. This may be performed on either the BI or the IR-image.

B—Banknote Face Classification Step.

A presumption for this step is that the size of the banknote image has been determined (in aligning step A), and a purpose of this step is to identify the scanned banknote and to identify orientation and side. Below is one embodiment discussed in detail but many other alternatives exist, as this information may already be available from other sensors of the system, i.e. from other sensors arranged to verify the authenticity to the input banknote. However, this step must be performed prior the remaining steps C and D.

Based upon the size, stored denomination data related to this size is identified. For example: one specific size has four different denomination data stored; front side (correctly oriented and up and down) and back side (correctly oriented and up and down). In some cases even a higher number of different denomination data might be stored. E.g. if different versions of a banknote have been issued.

For each stored denomination data certain fields are identified, being carefully chosen to represent a unique set of identification parts of the banknote. These fields may be part of the banknote that should be white (or light coloured). The number of fields chosen depends upon the outlook of the banknote, e.g. a very coloured banknote requires more fields. Also the geometric shape of a specific field is chosen in relation to the outlook of the banknote and could be rectangular, circular or any suitable shape.

In the case where four denomination data are used the respective data field are all compared to the detected banknote image and the denomination of the detected banknote is then identified being the banknote where the fields corresponds to the fields of one of the stored denomination data. As a result the denomination and which side and orientation of the banknote that the detected banknote image relates to is identified.

More in detail, this step is performed by using a predetermined number of sample regions that together are unique for a banknote of a determined size. The classification is performed by a banknote face classification unit by calculating at least one value related to the pixel values of each sample region of the aligned banknote image and comparing the at least one pixel values to specified values

representing a specific banknote face to determine face and orientation of the banknote image.

In this step it is determined which face (side) of the banknote the image represents, and also the orientation of the banknote.

FIG. 7 shows four different images of one banknote, the front side, back side (upper row) and each side rotated 180 degrees (lower row).

The banknote image document is classified as a recognized size and recognized face-image, or it may be considered as unclassified.

The face of the banknote is recognized by using small rectangle sample regions, or any other shape, e.g. circular, that together are unique for the face of the determined size. Each specific banknote is represented by four different images where each has its face sample regions. This is illustrated in FIG. 7 and the four different images is the front side, back side and each side rotated 180 degrees.

The regions are identified by the number of dark pixels in the region. Any combination of the layers (CMY) and any threshold-level may be adapted individually for each region.

Thus, the result is a numerical value of face-identification and information if face is upside down. Unclassified face results in that the banknote is classified as a dyed banknote. The information regarding the identified face of the detected banknote is necessary in the following steps as the corresponding face of the reference banknote image (RBI) is to be used.

C—Printed Pattern Positioning Step

The printed pattern on a banknote is located at individual predetermined positions for individual banknotes due to slight differences related to production tolerances. The pattern position must therefore be accurately determined for the banknote to be able to perform accurate comparisons to the reference banknote image.

It is therefore extremely important that the detected image is positioned in a known position before the comparison step is performed.

FIG. 8 illustrates the step of locating the pattern position.

To perform this, two predefined limited regions are identified, one horizontal region X and one vertical region Y which are shown in FIG. 8.

With references to region X in FIG. 8 the limited region is scanned to create a line-pattern (strip or line S in the illustration). The line-pattern is created by calculating the mean value of all pixels in one vertical row in the region and then aligning all mean values. The result is a small data-area that represents the whole defined region. Only one predefined layer of CMY is selected individually for each face/scanning (but in the figure it is shown as monochrome grey).

The scanned line-pattern S is compared to a reference line-pattern R. By trying to match R and S in a number of different positions, by comparing the sums of all pixels difference abs(R-S) in the line, a best match adjusted position offset is the result. Objects that are not position-related to the pattern, such as metallic strips, are masked out and not included in the comparison. The adjusted position is illustrated as the line R and is moved to an adjusted position line A. The reference line-pattern R is typically created from mean-values from 800 scanned images that are pattern-matched.

FIG. 6 illustrates a zoomed detail of the adjusted strips, i.e. of a matched pattern position during the matching step. Here the different strips are denoted Rx, A_x and S_X.

Preferably the reference-line R is moved to an adjusted position line A, that achieves good matching to the scanned line-image S. However, the important feature is how much the scanned line-image S has to be moved in relation to the reference-line R in order to achieve a good matching, irrespectively if line R or line S is moved.

This process for horizontal pattern X-match is repeated for vertical pattern Y-match. The x and y offsets are saved for later reference during the pattern-comparison step.

It should be noted that by this positioning step the picture (pattern) on a banknote is correctly positioned in relation to the pattern of the reference image which is necessary in order to obtain very accurate results in the next step.

By instead using e.g. the corners of the banknote in order to correctly position the banknote would not result in that the banknote is enough accurately positioned to ascertain highest possible detection yield in the next step, e.g. the picture on banknotes is often not positioned in exactly the same place on the paper and that

the size, and then the position of the corners, might deviate up to one or two millimetres between different banknotes.

Preprocessing of a Reference Banknote Image (RBI).

A reference image of each face of a banknote must be created in order to perform the comparison step with the banknote to be investigated.

This process to create reference images are made only once prior when the banknote detector device is set up for use. Thus, before an entire banknote can be scanned for robbery ink colour, a reference image for each face must be available to know where printed colour already exist as normal pattern of a banknote, and how normal existing dirt appear.

FIG. 10 illustrates a reference image created by calculating the mean-value of the pixels of each pixel position from typically 200 street quality banknotes.

According to a preferred embodiment typically 200 banknotes are scanned in a detector machine, e.g. a CIS-sensor. The number must be at least 100, and if possible as many as 400. To avoid repeatable inaccuracy such as individual detector-specific inaccuracy, images are sampled from two different detectors in the machine, and from different scanned faces-directions. The banknotes should be of street quality including normal existing dirt etc.

The scanned image is stored in an RBI storage as an RGB image. In order to facilitate the further processing of the image, the image is preferably “inversed” and stored as a CMY image (Cyan, Magenta, Yellow).

All 800 images for one banknote (front side, backside, and each side rotated 180 degrees) are then matched together by the pattern. To perform the pattern-match, the printed pattern positioning step (C) described above is used, but since the final reference line-pattern is based on this mean-image, a temporary reference line-pattern created from one single good quality note is used in the first iterate. After the pattern-matching, the reference image is created by calculating the mean-value of the pixels of each pixel position.

In an iterate method to increase reference image quality, this first created reference image is now used to create a new better reference line-pattern to be used in the step C. This process to create a reference image mean-value from the 800 images is

then repeated, but instead of using the single good quality note, the improved mean-value reference line-pattern data is used.

The iterated reference image is cropped (outer line in FIG. 11) by estimating the end where a few individual notes paper no longer exist (i.e. where pattern and dirt start get lighter). The result should be a reference-size of a minimum paper-size rather than a mean-size.

The result is only for the reference line-pattern purpose, the entire mean-image is not used and may only be saved to re-create a modified reference line-pattern with a new defined region.

FIG. 11 shows a street quality processed reference banknote image.

After the final reference line-pattern is ready, a reference banknote image is created for colour detection purpose.

The reference image for detection purposes should accept individual typical darker detected banknotes, due to individual banknote production pattern-darkness or individual dirt etc. In addition the reference image for detection purpose should accept smaller individual mismatch of located position for detected notes.

All 800 images are used again, and after matched by locating the pattern position, each CMY-layer pixels are separately calculated by mean value plus one standard-deviation for each of the 800 images. This will make the reference image darker.

Furthermore, starting by the resulting reference image each pixel are moved to the 8 closest adjacent positions to create total 9 identical images but with 9 different positions. The CMY-layers of the 9 images are separately merged by choosing the darkest pixel. This will make the reference image less sensible to mismatched detected banknotes.

The result that consist of a reference line-pattern and a processed reference images for each face are merged together with the detection-application in the target system. This processed reference banknote image is denoted RBI and is stored in the RBI storage and illustrated in FIG. 11.

D—Comparison Step

Now, going back to the processing of a banknote inserted into a banknote handling machine.

After that the location of the pattern position is determined according to step C, the banknote image is divided into different defined detection zones to be differently processed by the colour detection algorithms.

FIG. 12 shows masked out and not detected region of a banknote. Predefined non-detectable zones are regions that may include objects that are not position-related to the pattern, such as metallic strips. They are masked out and not detected.

All the region that match inside the reference image is detected by reference-detection. Regions outside the reference image is detected by a non-reference-detection if the region is white which is marked by magenta (see arrows) in FIG. 12, while if the region outside the reference is a pattern-region then it is non-detectable and just masked out (see illustration where a magenta-zone is cut).

Each pixels in the image that are detectable is iterated for detection and is denoted a dyed-value. The dyed-value is higher on clearly ink-coloured spots while a more doubtable ink-coloured spot results in a lower dyed-value. If the sum-value of all pixels' dyed-values exceeds a predefined level this results in that the banknote is classified as a dyed banknote.

FIG. 13 illustrates an image pixel grid where dp denotes a detected pixel and ap denotes ambient pixels.

Since a large amount of individual single pixels with positive ink-detection due to e.g. optical interference exist, the detection is set up such that a single pixel never will result in a dyed-value. According to one embodiment only the detected pixel dp together with the 4 closest ambient pixels may be detected as a dyed spot. The detected pixel is detected by a detection colour-algorithm, while the ambient pixels condition must only match the detected pixel in CMY colour levels to create a dyed spot, i.e. to qualify the detected pixel. A smaller or larger number of ambient pixels may be used in this step as the chosen number depends inter alia upon the required accuracy and available processing capacity. For example 8 or 12 ambient pixels could be used in this regard.

The colour-classification of the pixels will be discussed in the following. Each detect pixel colours are classified for detection purpose. In FIGS. 14-16 a number of colour CMY diagrams are shown—only shown in a grey-scale. Colour diagrams show only

the pure colour composite, while the grey-scale, down to black, are not shown in the diagrams but is included in the classification.

FIG. 14 is a non-grey colour diagram, although shown in a grey-scale, where cyan, yellow and magenta are indicated.

The class “grey-colour” is the central part of the non-grey diagram, included all the grey-scale from white to black. The purpose for this is that detection should be less sensible to grey colours since the captured image creates a lot of grey-scale shadows and grey-scale sensible-defects.

FIG. 15 is a dirt-colours diagram.

The class “dirt-colour” is rare existing robbery ink colours, while this spectra is (except grey) the most common for dirt. This class is less sensible to colour detection.

FIG. 16 is a high-gain colours diagram Class “high-gain colour” is specific monochrome existing robbery ink colours that also typically is low-level colour. These specific colours, cyan and magenta, are therefore treated by using an extra sensible detection.

A colour detection algorithm will be described in the following.

For all iterated detection pixels, a CMY value must exceed a threshold level, where the threshold level is typically determined by the reference banknote image (RBI). Then the detection pixel must agree with the ambient pixels' colours, and then a dyed-value is determined for the detected pixel.

More in detail this is performed as described in the following:

Each detect-pixel position is iterated. For reference-detection CMY threshold levels are found by reading out the CMY-values from the reference image position, while for a non-reference-detection the threshold levels are fixed. The detect pixel CMY-value is read out.

If the detected pixel colour is a predefined “high-gain colour” and all CMY threshold-levels are less than 80 (i.e. only light regions), then the threshold levels are lowered by half for extra sensibility.

The detect-pixel CMY-values are compared to the CMY threshold-levels. If all CMY values are under the threshold-levels, the detect-pixel is considered as a not dyed spot, else the detect-pixel colour is classified, i.e. given a dyed-value. If grey or dirt-colour class, the threshold-levels will be increased and the comparison is repeated with the higher threshold levels and detect-pixel may be a not dyed spot, else the detection continues by comparing the detected pixel with the ambient pixels. If any of the ambient pixels have a level different than the detected pixel, the spot is considered as not dyed, else the detection continues by evaluating the dyed value.

The dyed value is counted by a progressive value due to how much the detected pixel CMY values exceed the threshold levels, only the highest exceeded value of CMY is the base to the dyed-value. At last if the detected pixel colour class is grey or dirt-colour, the dyed-value will be lowered or even may be disregarded as not dyed.

The result is summed for all iterated pixels into a total dyed-value for the entire banknote. The banknote is considered as dyed if the total dyed-value exceed a predefined level and a non-accepted signal is generated by the comparison unit, else an accepted signal is generated.

In summary, the comparison step comprises two different sub-steps, or subtests:

Threshold test—only applied if BI pixel is in the colour-scale “grey”.
Spot test—to be regarded as a spot not only one pixel is required, but preferably the detected pixel and four ambient pixels should have essentially the same colour.

A requirement to perform the spot test is that the detected pixel and four ambient pixels, see FIG. 13, have essentially the same colour, then a difference value for the detected pixel with regard to the corresponding pixel in the RBI is determined.

Different parts of the colour diagram have different related points. The colour of the detected difference pixels must be determined. If a detected difference is an accepted detected difference depends also where in the colour diagram the colour for the identified detected difference pixel is positioned.

If the pixel is in the green/red part a higher point is given the dyed-value.

If the pixel is in the grey or brown parts a relatively lower point is given the dyed-value.

In addition, if a large difference between RBI and BI pixel values are determined additional higher “points” may be awarded that pixel's dyed-value, e.g. according to a progressive scale.

An overview of the comparison step is described as follows:

Step 1: If colours of dp and 4 ap:s are approximately the same then continue to next step, else go to next dp.
Step 2: Compare colours of BI dp and the corresponding RBI pixel and determine a difference value, DV, representing the difference between these colours.
Step 3: Determine the position in the colour diagram of BI dp and determine a colour value CV related to that position.
Step 4: Compare DV to CV and if DV exceeds CV, add DV to the dyed value calculation related to the banknote.
Step 5: If the total dyed value for the entire banknote exceeds a preset threshold value the banknote is classified as non-accepted, i.e. dyed.

As an example, the point awarding functions result in that few sharp red spots detected on the banknote result in an ink-dyed detection, and that many small red spots detected on the banknote also results in and gives an ink-dyed detection. This is due to the fact that the colour red is awarded high points in the colour diagram and that sharp colours, meaning higher detected difference, also is awarded a higher point.

A specific requirement for the banknote detector device is that all tests must be performed during a maximal time period of 100 ms.

The reason is that once the detection is performed, i.e. the banknote has passed the sensor, it continues along a feeding path to a junction where a non-accepted banknote is routed to a separate feeding path, and that the distance along the feeding path up to the junction must not be too long.

The present invention is not limited to the above-described preferred embodiments. Various alternatives, modifications and equivalents may be used. Therefore, the above embodiments should not be taken as limiting the scope of the invention, which is defined by the appending claims.

Claims

1. Method in a banknote detector device for an automatic teller machine, to be used to differentiate non-accepted banknotes from accepted banknotes, the device comprises a banknote image sensor to receive and scan at least one face of an input banknote and to store a banknote image (BI) of each scanned face in a storage in dependence of said scanning, said banknote image comprises image data in the form of a number of pixels; and a reference banknote image (RBI) storage where one reference banknote image (RBI), being processed from a predetermined number of banknote images from accepted street-quality banknotes, is stored for each face of each relevant banknote, the banknote detector device further comprises an IR image sensor that is arranged to scan an input banknote and to store an IR-image of said banknote in said storage such that the IR-image being linked to the corresponding banknote image, wherein said method comprises:

A) an alignment step where one side of the banknote image is aligned in relation to the respective side of the RBI by use of said IR-image, and that the banknote size is determined,

B) a banknote face classification step where the face and orientation of the banknote image are determined,

C) a printed pattern positioning step where the printed pattern of the banknote image (BI) is determined in order to exactly position the BI printed pattern in relation to the printed pattern of a reference banknote image (RBI),

D) a comparison step where, for at least one face of the banknote, the BI and RBI, being in exact pattern position in relation to each other, are compared pixel per pixel according to a predefined comparison procedure resulting in that the input banknote is classified as accepted or non-accepted,

2. Method according to claim 1, wherein in step A, a squeezing method is used where the angle between the dark rectangle of the IR-image and a horizontal line is determined, and the banknote image is then iteratively rotated until the banknote image is in a horizontal position, i.e. the longer side is horizontal.

3. Method according to claim 1, wherein in step C two predefined limited regions of the BI are identified, one horizontal region X having a preset width and running along the longer side of the banknote and one vertical region Y having a preset width and running along the shorter side of the banknote, a line-pattern is created by calculating the mean values of all pixels in one vertical row in the horizontal

region X and then aligning all mean values, resulting in a horizontal data-area line SX representing the whole region X, and the same procedure is performed for the vertical region Y resulting in a vertical data-area line Sy representing the whole region Y, wherein SX and Sy are compared to line-patterns of the RBI obtained in the same way and that said line-patterns are adjusted in relation to each other such that differences between corresponding pixel positions are minimized and the BI and RBI are then adjusted accordingly in relation to each other.

4. Method according to claim 1, wherein in said reference banknote image (RBI) storage one reference banknote image (RBI) is stored for each face of each relevant banknote such that each specific banknote is represented by four different images, one image per banknote side and each side rotated 180 degrees.

5. Method according to claim 1, wherein said RBI is obtained by processing, according to an RBI processing algorithm, in an image processor, a predetermined number of banknote images from accepted street-quality banknotes, wherein each pixel in the reference banknote image are moved to the 8 closest adjacent positions to create in total 9 identical images but with 9 different positions.

6. Method according to claim 1, wherein in step D a detected pixel is denoted a dyed-value as a result of comparison to a corresponding RBI pixel provided that a preset number of, preferably four, ambient pixels have essentially the same colour

7. Method according to claim 1, wherein in step D a difference value is determined for the detected pixel with regard to the corresponding pixel in the RBI and the difference value is compared to a colour value related to the position of the BI detected pixel in a colour diagram, and if said difference value exceeds the colour value a dyed value for the banknote is increased by the difference value.

8. Method according to claim 1, wherein in step D some predefined parts of the banknote are not taken into account, e.g. any metal strips, the serial numbers etc.

9. Banknote detector device for an automatic teller machine, to be used to differentiate non-accepted banknotes from accepted banknotes, the device comprises a banknote image sensor to receive and scan at least one face of an input banknote and to store a banknote image (BI) of each scanned face in a storage in dependence of said scanning, said banknote image comprises image data in the form of a number of pixels; a reference banknote image (RBI) storage where one reference banknote image (RBI), being processed from a predetermined number of

banknote images from accepted street-quality banknotes, is stored for each face of each relevant banknote, and

an IR image sensor arranged to scan an input banknote and to store an IR-image of said banknote in said storage such that the IR-image being linked to the corresponding banknote image,

wherein said detector device comprises

an alignment unit to align one side of the banknote image in relation to the respective side of the RBI by using said IR-image, and that the banknote size is determined,

a banknote face classification unit to determine face and orientation of the banknote image,

a printed pattern positioning unit where the printed pattern of the banknote image (BI) is determined in order to exactly position the BI printed pattern in relation to the printed pattern of a reference banknote image (RBI),

a comparison unit where, for at least one face of the banknote, the BI and RBI, being in exact pattern position in relation to each other, are compared pixel per pixel according to a predefined comparison procedure resulting in that the input banknote is classified as accepted or non-accepted.

10. Banknote detector device according to claim 9, wherein said alignment unit uses a squeezing method where the angle between the dark rectangle of the IR-image and a horizontal line is determined, and the banknote image is then iteratively rotated until the banknote image is in a horizontal position, i.e. the longer side is horizontal.

11. Banknote detector device according to claim 9, wherein in said pattern positioning unit two predefined limited regions of the BI are identified, one horizontal region X having a preset width and running along the longer side of the banknote and one vertical region Y having a preset width and running along the shorter side of the banknote, a line-pattern is created by calculating the mean values of all pixels in one vertical row in the horizontal region X and then aligning all mean values, resulting in a horizontal data-area line SX representing the whole region X, and the same procedure is performed for the vertical region Y resulting in a vertical data-area line Sy representing the whole region Y, wherein SX and Sy are compared

to respective line-patterns of the RBI obtained in the same way and that said line-patterns are adjusted in relation to each other such that differences between corresponding pixel positions are minimized and the BI and RBI are then adjusted accordingly in relation to each other.

12. Banknote detector device according to claim 9, wherein said banknote image sensor is a banknote RBG image sensor, and that the images are stored in CYM format.

13. Banknote detector device according to claim 9, wherein in said reference banknote image (RBI) storage one reference banknote image (RBI) is stored for each face of each relevant banknote such that each specific banknote is represented by four different images, one image per banknote face and each face rotated 180 degrees, said RBI is obtained by processing, according to an RBI processing algorithm, in an image processor.

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Current U.S. Class: **Reading Paper Currency (382/135)**
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JUSTIA

STACKING AND DISPENSING MODULE

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A stacking and dispensing module (2) for use in an automatic teller machine (4), the module is configured to be arranged in connection with a banknote storage unit (6) comprising a banknote tray (8) on which banknotes (10) are stacked, the stacking and dispensing module (2) is configured to be in a banknote stacking mode, when banknotes are stacked in said storage unit (6), and

in a banknote dispensing mode, when banknotes are dispensed from said storage unit (6). A stacking wheel member (12) is active both during the banknote stacking mode and during the banknote dispensing mode, and that the rotation of the stacking wheel member (12) is configured to be controlled by a first direct current (DC) motor (20), and the rotation of a dispensing wheel member (16) is configured to be controlled by a second DC motor (22). The module further comprises:—a current measuring unit (24) configured to measure the currents applied to drive said first and second DC motors (20, 22) and to generate current signals (26, 28) in dependence thereto,—a control unit (30) configured to receive said current signals (26, 28), wherein the control unit (30) is configured to evaluate said current signals (26, 28) and to determine control signals (32, 34) for various functions of said module in dependence of said evaluation, and to apply said control signals for controlling said functions.

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Description

TECHNICAL FIELD

The present disclosure relates to an automatic teller machine (ATM) for cash deposits and/or withdrawals. In particular the present disclosure relates to a stacking and dispensing module to be arranged in connection with each of a plurality of banknote storage units, e.g. cassettes, arranged within an ATM. The present disclosure also relates to an ATM provided with an advanced upper unit having the capability of reducing user intervention when depositing banknotes.

BACKGROUND

In spite of numerous predictions of a cashless society, the amount of cash in circulation has not declined. There are today an estimated 360 billion transactions in the EU every year to be compared with 60 billion non-cash transactions. The handling of cash is a very cost consuming operation still involving a lot of manual handling and transportation to and from consumers, retailers, banks, cash centres and National banks. The cash is counted on numerous occasions during this circulation and the security problems are extensive. The annual cost for handling of cash in the European Union is around 50 billion Euros. Significant savings could be made if a more rationalized and decentralized system could be introduced. The common currency makes it possible to take significant steps towards a more efficient handling of cash within the European Union with potential cost savings amounting to billions of Euro.

One concept that provides a very cost efficient solution to the handling of banknotes is embodied by a local cash handling system, the so-called Q-CashRouter® concept, which is provided by the applicant to the present application. The Q-CashRouter® system is herein generally referred to as a local cash handling system. It is an innovative self-service unit for efficient recycling of banknotes. It allows retailers to deposit their daily takings in full parallel with private consumers withdrawing cash. Banknotes are recycled locally in the machine, which minimizes the need for expensive cash transports and costly control processing of deposited banknotes. The concept is ideal for locations like shopping malls with its high volume flow of notes between shops, banks and consumers.

The local cash handling system may be configured with e.g. three or even more consumer fascias. This allows e.g. a retailer to deposit bundles of unsorted notes, in full parallel with two private consumers making cash withdrawals. The multiple-fascia support radically improves the efficiency of cash recycling and eliminates the inconvenience for consumers to have to queue-up behind retailers making large volume deposits. During the same time as one retailer deposits a bundle of e.g. 250 notes, the local cash handling system can process up to twelve consumers withdrawing cash at the two side fascias.

Deposited notes are sorted, quality controlled, and checked for counterfeits. Only notes of good quality are recycled to customers by the local cash handling system. Excess good quality notes are sorted and bundled in single or multidenomination sealed packages, which can be used directly, e.g. for loading of ATMs and as small-change cash for retailers.

The local cash handling system may be installed in environments where large volumes of cash is processed every day, e.g. in supermarkets, in shopping malls and in larger bank branch offices. A supermarket could use the local cash handling system to build a private protected room. Cashiers deposit their daily takings in the local cash handling system and receive a receipt on the deposited amount. At the end of the day the deposited amounts are automatically reconciled with the amounts captured by the point of sale (POS) system. No manual counting or sorting of notes is required.

U.S. Pat. No. 6,581,746 and U.S. Pat. No. 6,945,378 relate to different aspects of the cash handling system described above. In addition it is referred to the following prior art documents also disclosing various aspects of cash handling systems: U.S. Pat. No. 5,000,322, US-2004/0056086, and U.S. Pat. No. 5,756,985.

These patents and patent application disclose in particular the storage and circulation of banknotes within the system required achieving the local cash handling, e.g. the handling of banknotes of different denominations being stored in different storage means to be available for withdrawals, and the handling of non-accepted banknotes being sorted out and stored separately in sealed transparent envelopes.

A conventional ATM is normally provided with removable banknote storage units, so-called cassettes, where deposited banknotes are stacked and stored, and where banknotes are dispensed from during withdrawal.

Dependent of the cash-flow and of type of ATM, empty cassettes are replaced by full cassettes if withdrawals exceed the deposits, and full cassettes are replaced by empty cassettes if deposits exceed the withdrawals. Each cassette must be docked into the ATM such that stacking of banknotes within the cassette is facilitated if the ATM is a dedicated deposit ATM, and if the ATM is dedicated for withdrawals it must have capabilities for dispensing the banknote from the cassette. And if the ATM is adapted for both deposits and withdrawals the cassette must be docked into the ATM such that both stacking and dispensing of banknotes in the cassette is facilitated.

An object of the present invention is to achieve an improved stacking and dispensing module to be used in connection with a banknote storage unit, e.g. a cassette, which module is robust, easy adaptable to various types of banknotes, has high capacity with regard to speed and essentially no, or very low, failure rate. An object is to achieve an improved ATM provided with an upper unit capable of improving the banknote depositing procedure.

SUMMARY

The above-mentioned object is achieved by the present invention according to the independent claim.

Preferred embodiments are set forth in the dependent claims.

The stacking and dispensing module according to the present invention is a compact module providing capabilities both for stacking of banknotes in a banknote storage unit, e.g. a cassette, and dispensing (feeding out) banknotes from the same unit. One stacking and dispensing module is intended to be arranged in connection with each banknote storage unit.

Features are provided to handle the high-speed stacking/feeding procedure keeping a very low failure rate. In addition, the construction of the recycling module results in a module being less complicated e.g. in that fewer sensors are required, has a considerably lower weight and power consumption, and thus being less expensive, in comparison to presently available modules.

Below some important features are listed:

- - The precise and intelligent control of the stepping and direct current (DC) motors.
  - The delicate control of the note lifting tray in the cassette ensuring exactly the correct pressure between the banknote and the feeding means.
  - Active stacking wheels during both stacking and dispensing.
  - The note-synchronized stacking wheel speed.
  - The pressure control of note bundle during stacking and dispensing.
  - Using the driving currents to the DC motors as measurement values for controlling various functions of the module.
  - Automatically adapt the module for dispensing banknotes of different thickness, quality, etc.

The features of particular interest are the features related to the above advantages, i.e. related to achieving the high-speed stacking/dispensing procedure; the low failure rate, the lower weight, and the low power consumption.

The current consumptions of the DC-motors used to drive various structural details of the module are measured.

More specifically, the driving current for each DC motor is measured. As the driving current is dependent of the output force (torque) from the DC-motor a quantitative measure of the function performed by the DC motor is available, from the measured current, which measure is used for determining control parameters for the stacking and dispensing module.

By applying this insight the inventors have realized that the stacking and feeding module may have a more robust and simplified structure in comparison to modules where instead numerous dedicated sensors as well as complex mechanics must be arranged to detect parameters required to perform the delicate control of a high-speed stacking and dispensing module.

By measuring the driving currents, information is gained which is used to control various functions of the module. Thereby the module is made simpler and more robust in that this collected information may be used such that some sensors conventionally used for control purposes may be excluded.

The stacking wheel has an essentially circular shape, and has a predetermined thickness and the outer edge has an outer circumferential contact surface. During specific parts of both the stacking and dispensing procedure the contact surfaces of

the stacking wheels are in contact with an upper surface of a banknote on a banknote lifting tray of a cassette.

The contact with the upper surface of the banknote serves two purposes, firstly it levels the banknote, and secondly to control the level of the tray. More specifically, the stacking wheel is configured to be rotated by a DC-motor and the driving current of the DC motor is measured and the measured current value is used to control the level of the tray in the cassette.

Thus, the stacking wheel is used both during the stacking procedure and the dispensing procedure to control the level of the tray of the cassette.

In one embodiment an advanced upper unit is provided capable of reducing user intervention when deposited banknotes are detected as non-accepted. This is achieved by arranging a drum storage unit for temporary storage of non-accepted banknotes, and then automatically feeding those non-accepted banknotes at least a second time through the detection unit, and turning the banknote upside down for each consecutive passage.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an image of an automatic teller machine (ATM) according to the present invention.

FIG. 2 is a simplified block diagram schematically illustrating the stacking and dispensing module according to the present invention.

FIG. 3 is a cross-sectional view schematically illustrating an ATM including stacking and dispensing modules according to the present invention.

FIG. 4 is a cross-sectional side view illustrating the stacking and dispensing module according to the present invention in a banknote dispensing mode.

FIG. 5 is a cross-sectional side view illustrating the stacking and dispensing module according to the present invention in a banknote stacking mode.

FIG. 6 is a front view illustrating the stacking and dispensing module according to the present invention.

FIG. 7 is a view from the opposite side compared to FIG. 6 illustrating the stacking and dispensing module according to the present invention.

FIGS. 8-14 illustrate various aspects of an embodiment of the present invention.

DETAILED DESCRIPTION

Throughout the figures the same, or similar, items will have the same reference signs. FIG. 1 is an image of an automatic teller machine (ATM) **4**, provided with a user interface **9**, according to the present invention. The illustrated ATM has one fascia which could be applied for deposits only, for withdrawals only, or for both deposits and withdrawals if local recycling of banknotes is implemented.

FIG. 2 is a simplified block diagram schematically illustrating the stacking and dispensing module **2** according to the present invention.

In the figure one stacking and dispensing module **2** for use in an ATM **4** is illustrated. The flow of banknotes to be stacked is indicated by an arrow **3**, and the flow of banknotes to be dispensed is indicated by an arrow **5**.

The module is configured to be arranged in connection with a banknote storage unit **6** comprising a banknote tray **8**, on which banknotes **10** are stacked.

A conventional ATM is normally provided with removable banknote storage units, so-called cassettes, where deposited banknotes are stacked and stored, and where banknotes are dispensed from during withdrawal.

Dependent of the cash-flow and of type of ATM, empty cassettes are replaced by full cassettes if withdrawals exceed the deposits, and vice versa. Each cassette must be docked into the ATM such that stacking of banknotes within the cassette is facilitated if the ATM is a dedicated deposit ATM, and if the ATM is dedicated for withdrawals it must have capabilities for dispensing the banknote from the cassette. And if the ATM is adapted for both deposits and withdrawals the cassette must be docked into the ATM such that both stacking and dispensing of banknotes in the cassette is facilitated.

The stacking and dispensing module may also be arranged in connection with a so-called escrow unit 7, which is an intermediate storage unit (see FIG. 3).

FIG. 3 is a cross-sectional view schematically illustrating an ATM including stacking and dispensing modules according to the present invention. In the illustrated ATM five cassettes **6** are arranged. One stacking and dispensing module **2** is arranged in connection with each of the cassettes **6**, and in connection with the escrow unit **7**. A user interface **9** where a user may deposit and/or withdraw banknotes from the ATM is provided. The possible routes for banknotes within the ATM are schematically illustrated by small arrows. Additional structural details are also shown in the figure but will not be discussed in detail as they are commonly known technique.

The stacking and dispensing module **2** is configured to be in a banknote stacking mode, which is illustrated in FIG. 5, when banknotes are stacked in the storage unit **6**, and in a banknote dispensing mode, which is illustrated in FIG. 4, when banknotes are dispensed from the storage unit **6**.

FIGS. 4-7 illustrate various view of the stacking and dispensing module according to the present invention. In those figures only features being essential for describing the present invention will be referenced to. Thus, for sake of simplicity numerous structural details, e.g. rollers, guiding members, bars, shafts, etc. will not be described herein.

The stacking and dispensing module comprises a stacking wheel member **12** (see FIG. 2), which is configured to receive and stack banknotes on the tray **8**. The stacking wheel member **12** comprises at least two stacking wheels **14** distributed along a common rotation shaft A having a longitudinal rotation axis designated with dashed lines (see FIGS. 4-6). Preferably, the stacking wheels **14** are distributed along the common rotation shaft A, such that they essentially cover a major part of a banknote **10** on the banknote tray **8**, thereby performing a levelling of the banknote in a horizontal plane. In the module illustrated in FIG. 6, the stacking wheel member **12** comprises four stacking wheels **14** which are essentially symmetrically distributed along the rotation shaft A.

The stacking and dispensing module also comprises a dispensing wheel member **16** (see FIG. 2), which is configured to dispense banknotes from the tray **8**. The dispensing wheel member **16** comprises a predetermined number of dispensing wheels **18** (see FIGS. 4, 5, 7) arranged for rotation around a common first rotation shaft B having a longitudinal rotation axis designated with dashed lines, and that the dispensing wheels **18** are configured to be rotated in a first dispensing direction, see arrow **19** in FIG. 4, when banknotes are dispensed from the storage unit **6**.

The dispensing wheel member **16** is configured to receive banknotes moved from the stack of banknote in the banknote storage unit **6** by a banknote moving member **38**. The banknote moving member **38** is mounted on a shaft **39** which is parallel to shaft B. It is provided with a contact surface **41** made from a high frictional material, e.g. rubber, such that when the moving member **38** is rotated the vertical position of the tray is such that the banknote on top of the stack is moved to the right in the figure to a position where the rotating dispensing wheels, and in particular specific parts **43** of the circumferential edge surfaces, which also are provided with e.g. rubber, continue the movement of the banknote to the right. The rotations of the moving member **38** and the rotating dispensing wheels are synchronised.

The stacking and dispensing module comprises a predetermined number of separating rolls **40** for cooperation with the dispensing wheels **18** during movement of banknotes. The separating rolls **40** are arranged for rotation around a common second rotation shaft C having a longitudinal rotation axis designated with dashed lines, being parallel to shaft B. FIG. 7 is a view from the opposite side compared to FIG. 6 specifically illustrating how the dispensing wheels **18** and the separating rolls **40** are arranged in relation to each other.

In the illustrated example four dispensing wheels **18** and five separating rolls **40** are interleaved such that there is a slight overlap between adjacent rolls and wheels in the virtual plane where the banknote will pass. This results in that the banknote will be slightly corrugated during passage.

The respective contact surfaces on the outer circumferential edge of the dispensing wheels and the separating rolls are made from a high frictional material, e.g. rubber.

Furthermore, the dispensing wheels **18** are advantageously configured to be rotated in a second returning direction, opposite to the first direction, where banknotes are returned to the banknote storage unit **6**.

The rotation of the separating rolls **40** is only allowed for cooperating with the dispensing wheels **18** when the dispensing wheels rotate in the returning direction, but prevented in the opposite direction.

Thus, the dispensing wheels are configured to be rotated in a first dispensing direction where banknotes are dispensed from the cassette and in a second returning direction where banknotes are returned to the cassette, e.g. in case of

detection of two or more banknotes that arrives at the same time which may be the case if they stick together, etc.

In one embodiment of the present invention a movement member **42** is provided which is configured to vary the perpendicular distance d between the shafts B and C in dependence of a second control signal **34** from a control unit **30**. The movement member **42** is e.g. a stepping motor. The distance d between shafts B and C is variable, and in particularly it is automatically variable. By varying the distance d it is possible to automatically adapt the module for dispensing banknotes of different thickness, quality, etc. A typical overlap of the dispensing wheel and rollers is 0.25 mm and the variation may be in steps of 0.01 mm.

If the driving current of the DC motor configured to drive the dispensing wheels deviate from a set value a possible reason may be that two or more banknotes stick together and have been moved from the stack by the banknote moving member. The increased thickness of the banknotes results in that a higher torque, and then consequently a higher driving current, is required for rotating the dispensing wheels.

This enables a robust and straightforward detection of non-accepted situations, e.g. situations where two or more banknotes are moved or when a banknote is folded, etc. This detection method obviates the need of dedicated sensors and immediately adapts the dispensing capability to the actual situation, i.e. the thickness of the banknote.

Thus, if it is detected that two, or more, banknotes have been moved from the stack, these are returned to the stack and some further attempts are made, e.g. two or three. If, after the last attempt, it is still detected that the thickness deviates from an acceptable thickness the two (or more) banknotes will be fed out and rejected.

The stacking wheel member **12** is active both during the banknote stacking mode and during the banknote dispensing mode, and the rotation of the stacking wheel member **12** is configured to be controlled by a first direct current (DC) motor **20** (FIG. 6).

The rotation of the dispensing wheel member **16** is configured to be controlled by a second DC motor **22** (FIG. 6).

The module according to the present invention further comprises a current measuring unit **24** configured to measure the currents **25** applied to drive the first

and second DC motors **20**, **22** and to generate current signals **26**, **28** in dependence thereto. There are several methods of measuring current, the most common method is to perform an indirect measurement by measuring the voltage across a precision resistor and using Ohm's law to measure the current across the resistor.

A control unit **30** is provided configured to receive the current signals **26**, **28**, and to evaluate the current signals **26**, **28**.

The control unit is further configured to determine control signals **32**, **34** for various functions of the module in dependence of the evaluation, and to apply the control signals to various parts of the module for controlling the functions. The evaluation of the current signals **26**, **28** comprises comparing current values to predetermined threshold values related to the respective functions.

The functions comprise at least one of controlling the vertical movement of the tray **8** and controlling a dispensing wheel member parameter, which preferably is related to the thickness of one banknote.

In one embodiment the control unit **30** is configured to determine a first control signal **32** in dependence of the current signal **26** from the first DC motor **20**, and to apply this first control signal **32** to a tray movement member **36** to perform vertical movement of the tray **8**.

The stacking wheel member **12** is active in the sense that it is rotated and current is measured both during the banknote stacking mode and banknote dispensing mode. This means that a measure of the friction between the stacking wheels and the top banknote at the stack is determined continuously by measuring the driving current of the first DC motor. This measure is related to the level of the tray such that a high friction value (higher driving current) means that the tray must be lowered, and vice versa. Acceptable friction values correspond to a range of acceptable vertical levels of the top banknote for achieving high quality stacking and dispensing procedures.

In one implementation the vertical position of the tray is automatically adjusted upwards or downwards e.g. every fourth banknote being dispensed or stacked, respectively. A typical adjustment is 0.25 mm. The measurements performed by the control unit by evaluating the driving current of the first DC motor results in an improved control of the vertical tray level.

To perform the stacking action each stacking wheel **14** is provided with a predetermined number of banknote receiving slots **44**, e.g. three slots. Each slot has an essentially semi-circular curvature running from an outer edge of the wheel in a tangential direction in the outer third part of the radius of the stacking wheel, wherein the radius of the slot curvature essentially corresponds, or is slightly shorter, to the radius of the stacking wheel. Thereby is achieved that the banknote is received and stacked smoothly in that it is only bent as little as possible in its shorter direction.

A banknote enters the slot when the entry opening is positioned upwards and is properly positioned in relation to the route leading the banknote to the module. The banknote is fed into the slot until it reaches the end point of the slot. As the stacking wheel rotates the leading edge of the banknote comes into contact with a banknote stop member **45** which enables smooth delivery of the banknote to the stack in the cassette.

The present invention also relates to an automatic teller machine (ATM) comprising a predetermined number of banknote storage units **6**, wherein each storage unit is provided with a stacking and dispensing module as described above. The ATM may have one or several customer fascia and may be adapted for deposits, withdrawals, and also for combined ATMs, allowing both deposits and withdrawals.

The stacking and dispensing module also comprises a gate member which is used to switch and guide banknotes into the route leading to the stacking wheel. It is controlled by a solenoid switch and is spring-loaded such that it enables a fast and bounce free switching.

In one optional implementation a camera unit is arranged in relation to a deposit tray where a user deposits banknotes, e.g. in relation to the user interface **9**. The camera unit is intended to visually identify the banknote(s) being deposited and capture an image of the banknote(s). The captured image is compared to a corresponding reference banknote image. If the result of the comparison indicates that the deposited banknote differs too much from the reference banknote image the user is notified, either by a message on an interface display or audibly, that the banknote not will be accepted. The reason could be that the deposited banknote is folded or damaged, etc. The user may then remove the banknote, and try once more.

With references to FIG. 3 the user interface **9** will be further described. In one implementation the stacking and dispensing module **2** is arranged in connection

with the user interface **9**. A deposit tray **47** is provided where a user may deposit a bundle of banknotes **10**. The deposit tray is hidden by a shutter **13** (see FIG. 1) when the ATM not is in use. When a deposition of banknote is about to take place the shutter **13** will open, e.g. when the user inserts a card. During the opening the shutter will move downwards until its upper edge reaches the level of the deposit tray which makes it easy to deposit a bundle of banknotes. The size of the opening is set in advanced by the ATM administrator in relation to the maximum size of the bundle of banknotes that should be allowed to be deposited, e.g. representing 200, 300, or 500 banknotes. Thus, the shutter **13** is movable and controlled together with the tray **47** such that the tray and shutter enables easy deposition of the banknote bundle. During the next step of deposition the dispensing wheel member together with the moving member will move banknotes from the deposit tray **47** to a banknote storage unit. During this procedure a corresponding measurement of the thickness of the banknotes as described above is performed.

In the following a further embodiment of the automatic teller machine will be disclosed with references to FIGS. 8-14.

A new type of advanced upper unit **52** is applied which is structured to implement an advantageous functionality. This new type of upper unit **52** is structured to be arranged in connection with, and work in combination with, the stacking and dispensing module described above with references to FIGS. 1-7, and in an ATM, provided with a lower unit **54** comprising stacking and dispensing modules, cassettes, and other items described in relation to the ATM disclosed herein. For case of simplicity the stacking and dispensing modules have been obviated in some of the FIGS. 8-14.

In a presently used solution, banknotes which are not accepted by the ATM are returned to the user that is instructed to reinsert/redeposit the banknote once more, e.g. after having unfolded it, or after having flattened it out, etc. This may result in irritation of the user and also has the consequence that the capacity of the ATM is reduced as the queue increases.

An object to be achieved by implementing the new type of advanced upper unit, and a new procedure in relation thereto is to reduce manual interference of ATMs of today when depositing banknotes.

A user deposits a bundle of banknotes on a deposit tray. The banknotes are fed one by one through a detector unit provided with various sensors for determining a

number of different parameters of the banknote is dependent of measurements performed by the sensors. These parameters may include to determine the banknote denomination; the banknote quality, e.g. to determine if the banknote is dirty, ink-dyed, etc.; the authenticity of the banknote; if the banknote is folded, etc.

Based upon the state of these parameters it is determined how to handle the banknote.

The alternatives may be:

- - Not accept the banknote.
  - Accept the banknote.

The criteria for determining if a banknote should be accepted or not accepted may vary in dependence of specific regulation of the country where the ATM is installed.

In the ATM illustrated in FIGS. 8-14 an intermediate storage module is arranged in connection with the detector unit.

The intermediate storage module comprises at least two so-called drum storage units, one dedicated for accepted banknotes, a first drum storage unit (herein also denoted Escrow storage), and one dedicated for non-accepted banknotes, a second drum storage unit (herein also denoted temporary storage).

A drum storage unit is a commonly used type of storage module where banknotes are stored serially, up-winded in a drum. In U.S. Pat. No. 8,186,673 is disclosed one example of a drum storage which may be applicable when realizing the present invention.

The basic idea governing the implementation of the advanced upper unit **52** (see FIG. 8) is to let a banknote that was determined non-accepted by the detection unit pass the detection unit at least a second time without feeding it out to the user. In addition the banknote is turned upside down in comparison to when the banknote first passed through the detection unit during a first detection procedure. By turning the banknote upside down is herein meant that the side of the banknote facing downwards is turned upwards.

Thereby, according to gained experience, some of the non-accepted banknotes will instead be determined as accepted. Naturally, it is possible to turn the banknote one

or many additional times and pass the banknote through the detection unit additional times.

Thus, the non-accepted banknotes are serially stored in the second drum storage unit. The banknotes are then fed into the detection unit one more time, in a turned state and being fed through the detection unit in the same direction as the first time.

The detection unit is adapted to only receive banknotes in one feeding direction. This is advantageous in that a less advanced and thus less expensive detection unit is then required which reduces the error rate and the detection unit is therefore more reliable.

It is also important to have the banknotes in a central position, e.g. in a mid-position, of the conveyer belt/transport track. This is an important aspect when the banknotes enter the storage cassettes in the lower part of the ATM in order to provide for an optimal stacking procedure inside the cassette such that a stable pile of banknotes within the cassette is achieved. Therefore, a banknote adjusting unit (or centralizer) C is provided. This unit is configured to centre the banknotes when they are fed along the transport track. The adjusting unit may be provided at various positions along the conveyor belt in the advanced upper unit **52**. One advantageous position is to arrange the adjusting unit C along an upper conveyer route **50** (see FIG. 8) between the ES/TS storage units and the I/O module. As an alternative the adjusting unit C is instead arranged between the I/O module and the detection unit BV. The adjusting unit C is indicated by a rectangle having a dashed borderline, and will be described more in detail below with references to FIG. 13.

FIG. 8 shows a schematic illustration of an automatic teller machine according to an embodiment of the present invention including the advanced upper unit **52**. In the figure the following abbreviations have been used:

- An I/O module—an input/output module where the user deposits/withdraws banknotes.
- An Escrow storage (ES) of drum type, also denoted first drum storage unit. This is a temporary storage unit for deposited banknotes being accepted.
- A Temporary storage (TS) of drum type for non-accepted banknotes, also denoted second drum storage unit. The TS is used for automatic banknote retry if detection is vague, i.e. if the detection unit concludes that the banknote not is accepted according presently applied criteria. It thereby reduces the need for customer intervention. The banknotes are

temporarily stored herein and are fed out at least once more and passed through the detection unit. The banknotes are then transported along the upper conveyor route **50**. As the TS is a drum type storage and in combination with the chosen transportation route the banknotes will then be turned upside down, in comparison to when they passed the detection unit before they were stored in the TS.

- A banknote adjusting unit (C). This unit is structured to adjust the banknote to be in a central position at the conveyor belt performing the transportation of banknotes. The banknote adjusting unit is preferably arranged along an upper conveyer belt and prior the banknote is transported to cassettes **6**. As will be discussed below the banknote adjusting unit may be implemented by so-called omni-wheels.
- A banknote validator (BV), or detection unit. It should be noted that banknotes may only pass the detection unit in one direction, in the figure from the right to the left.
- Banknote cassettes (used for recycling purposes) **6**.
- At least one acceptance cassette (used for deposit purposes) **6**.

FIGS. 9 and 10 illustrate the functions during a normal deposit procedure where all deposited banknotes are accepted.

All notes deposited in the I/O module are sent to the Escrow module (ES) via the detection unit (BV) and optionally via the banknote adjusting unit C.

As all banknotes are accepted they are routed to the Escrow module. Thereafter, i.e. when all banknotes have been stored in the Escrow module, they are transported to one or many of the cassettes **6**, via the upper conveyor route **50** and the banknote adjusting unit C.

The bold line illustrates the route of the accepted banknotes from the I/O module to the Escrow module.

FIGS. 9 and 10 illustrate the same procedure, and the only difference is in relation to the cassette part of the ATM in relation to which side the door (DOOR) to the safe is arranged. At the same side as the door is arranged some further storage units are provided which are indicated in the figures by four squares. These may include storage units adapted for e.g. retracted or rejected banknotes. The handling of non-accepted banknotes is governed in accordance with country specific regulations, which not will be further discussed herein.

FIGS. 11 and 12 illustrate the functions where some banknotes are not being accepted, and then being fed through the detector unit again.

Accepted banknotes deposited in the I/O module are sent to the Escrow module via the detection unit (BV) and optionally the banknote adjusting unit C.

Non accepted banknotes are sent to the TS. As discussed above the non-accepted banknotes may include banknotes not possible to detect, forgeries and suspected banknotes.

The bold line illustrates the route of the banknotes. If a banknote was found accepted by the BV the banknote is routed to the ES which is illustrated by a bold line. If the banknote was found non-accepted it is routed to the TS which is illustrated by a bold dashed line.

Thereafter when all banknotes are received, the non-accepted banknotes are fed out from the TS, via the upper route **50** and the banknote adjusting unit C and through the detector unit BV once again. Accepted banknotes are then routed to ES and if any non-accepted banknotes are detected after this second passage through the detection unit the non-accepted banknote may be routed to TS, e.g. for one more passage through the detection unit, or may be returned to the user directly via the I/O module without storing it in the TS, or may be fed to a cassette in the lower part of the ATM. Which of these alternatives that applies is e.g. dependent on country-specific regulations.

FIGS. 11 and 12 illustrate the same procedure, and the only difference is in relation to the cassette part of the ATM in relation to which side the DOOR is arranged.

The adjusting unit C is provided with a banknote centring member.

Preferably, the centring member comprises a number of so-called omni-wheels specifically arranged to perform the centring action.

Omni-wheels or poly wheels, similar to Mecanum wheels, are wheels with small discs around the circumference which are perpendicular to the turning direction. The effect is that the wheel can be driven with full force, but will also slide laterally with great ease. These wheels are often employed in holonomic drive systems.

With references to FIG. 13 the function of the banknote centring member according to one embodiment will be described in detail.

In the schematic figure the banknote **10** will enter the banknote centring member from below at centralization station **1** (indicated by a bold number to the left) which is illustrated by a block arrow and the banknote will be transported in that direction. The banknote will then continue through the banknote centring member C and pass centralization stations **2** and **3**.

The banknote centring member comprises a predetermined number (two or more) of omni-wheels **60**, **61** which enables simultaneous movement in a direction perpendicular to the transport direction, which is in the left-right direction in the figure and which is illustrated by dashed double-arrows. The omni-wheels are rotated by motors (not shown) via driving shafts **62**, **63**.

The centralization station **2** is provided with at least one omni-wheel **61** positioned in 90° angle to the transportation wheels **60** coupled to a separate motor being configured to rotate the wheel via the shaft **63** in both clockwise and counter-clockwise direction at different speeds.

At least two optical array units **64** are provided and positioned on equal distances from the centreline **66** of the transport path. When the banknote obstructs the array units the difference of the incoming light between the two array units are measured and the motor is configured to be controlled to move the banknote towards the direction with highest light value. When the light values of the array units are essentially equal the banknote is considered to be centred with respect to the centreline of the transport path and the motor is stopped. The station **2** is now ready to receive the next banknote without any need to reset or reposition any mechanical parts.

The banknote **10** will exit the banknote centring member at station **3** which also is provided with omni-wheels **60** being configured to allow the banknote to move freely in a direction perpendicular to the transport direction while it is transported in the transport direction. The exit station can be utilized with two wheels on a common shaft **62** or have the wheels separated on individual shafts, which also is applicable for station **1**. In the latter case with separate shafts and an extra motor connected to at least one of the shafts and controlled in a similar way as the centralization station also the skew angle (the banknote's angle relative to the centreline **66** of the transport path) of the banknote may be adjusted by controlling the respective shaft such that the two wheels will have a slightly different speed.

FIG. 14 is a schematic illustration of an ATM where the advanced upper unit is implemented. To the left in the figure is shown a front view of the ATM, and to the right is shown a cross-sectional view of the ATM, where in particular the advanced upper unit **52** is shown.

The present invention is not limited to the above-described preferred embodiments. Various alternatives, modifications and equivalents may be used. Therefore, the above embodiments should not be taken as limiting the scope of the invention, which is defined by the appending claims.

Claims

1. A stacking and dispensing module for use in an automatic teller machine, the module is configured to be arranged in connection with a banknote storage unit comprising a banknote tray on which banknotes are stacked, the stacking and dispensing module is configured to be in a banknote stacking mode, when banknotes are stacked in said storage unit, and in a banknote dispensing mode, when banknotes are dispensed from said storage unit, the stacking and dispensing module comprises:

> a stacking wheel member configured to receive and stack banknotes on said tray, comprising at least two stacking wheels distributed along a common rotation shaft A,
>
> a dispensing wheel member configured to dispense banknotes from said tray, comprising a predetermined number of dispensing wheels arranged for rotation around a common first rotation shaft B, the dispensing wheels are configured to be rotated in a first dispensing direction when banknotes are dispensed from the storage unit, wherein said stacking wheel member is active both during the banknote stacking mode and during the banknote dispensing mode, and that the rotation of said stacking wheel member is configured to be controlled by a first direct current motor, and the rotation of said dispensing wheel member is configured to be controlled by a second DC motor, wherein the module further comprises:
>
> a current measuring unit configured to measure the currents applied to drive said first and second DC motors and to generate current signals in dependence thereto,

a control unit configured to receive said current signals, wherein the control unit is configured to evaluate said current signals and to determine control signals for various functions of said module in dependence of said evaluation, and to apply said control signals for controlling said functions.

2. The stacking and dispensing module according to claim 1, wherein said evaluation of the current signals comprise comparing current values to predetermined threshold values related to the respective functions.

3. The stacking and dispensing module according to claim 1, wherein said functions comprise at least one of controlling the vertical movement of said tray and controlling a dispensing wheel member parameter.

4. The stacking and dispensing module according to claim 1, wherein said dispensing wheel member parameter is related to the thickness of one banknote.

5. The stacking and dispensing module according to claim 1, wherein the control unit is configured to determine a first control signal in dependence of said current signal from said first DC motor, and to apply said first control signal to a tray movement member to perform vertical movement of said tray.

6. The stacking and dispensing module according to claim 1, wherein said stacking wheels are distributed along said common rotation shaft A, such that they essentially cover a major part of a banknote on the banknote tray, thereby performing a levelling of the banknote in a horizontal plane.

7. The stacking and dispensing module according to claim 1, wherein said stacking wheel member comprises four stacking wheels which are symmetrically distributed along said rotation shaft A.

8. The stacking and dispensing module according to claim 1, wherein said stacking wheel member is active in the sense that it is rotated and current is measured both during the banknote stacking mode and banknote dispensing mode.

9. The stacking and dispensing module according to claim 1, wherein the dispensing wheel member is configured to receive banknotes moved from the stack of banknote in the banknote storage unit by a banknote moving member.

10. The stacking and dispensing module according to claim 1, wherein said module comprises a predetermined number of separating rolls for cooperation with the

dispensing wheels during movement of banknotes, said separating rolls are arranged for rotation around a common second rotation shaft C, being parallel to shaft B, and wherein a movement member is provided configured to vary the perpendicular distance d between said shafts B and C in dependence of a second control signal from said control unit.

11. The stacking and dispensing module according to claim 1, wherein said dispensing wheels in addition are configured to be rotated in a second returning direction, opposite to said first direction, where banknotes are returned to the banknote storage unit.

12. The stacking and dispensing module according to claim 11, wherein the rotation of the separating rolls is only allowed for cooperating with the dispensing wheels when rotating in the returning direction, but prevented in the opposite direction.

13. The stacking and dispensing module according to claim 1, wherein each stacking wheel is provided with a predetermined number of banknote receiving slots, and that each slot has an essentially semi-circular curvature running from an outer edge of the wheel in a tangential direction in the outer third part of the radius of the stacking wheel, wherein the radius of the slot curvature essentially corresponds, or is slightly shorter, to the radius of the stacking wheel.

14. An automatic teller machine comprising a predetermined number of banknote storage units, wherein each storage unit is provided with a stacking and dispensing module according to claim 1.

15. The automatic teller machine according to claim 14, wherein the machine comprises an advanced upper unit comprising an input/output module adapted to receive and/or dispense banknotes, a detection unit configured for passage of banknotes in one direction and arranged to detect various parameters of banknotes to determine if a banknote is accepted or not accepted, an intermediate storage module comprising two drum storage units including a first drum storage unit for accepted banknotes and a second drum storage unit for non-accepted banknotes.

16. The automatic teller machine according to claim 15, wherein non-accepted banknotes are controlled to pass the detection unit at least one more time.

17. The automatic teller machine according to claim 15, wherein non-accepted banknotes stored in said second drum storage unit are controlled to pass the detection unit at least one more time.

18. The automatic teller machine according to claim 16, wherein the upper unit is provided with a banknote route such that the banknote is turned upside down every consecutive passage through said detection unit.

19. The automatic teller machine according to claim 15, wherein said upper unit comprises a banknote adjusting unit configured to adjust said banknote on a transport path to be in a central position of said path.

20. The automatic teller machine according to claim 19, wherein said banknote adjusting unit comprises one or more omni-wheels.

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JUSTIA

STRETCHER ARRANGEMENT FOR APPLYING A STRETCHING MOVEMENT TO A PERSON

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A stretcher arrangement (2) comprising a first sheet (4) and a second sheet (6) to be arranged on a bed (8) having a first end (10) and a second end (12), and a length L along a longitudinal axis A. The first sheet (4) comprises a first surface (14), being a part of the first sheet that faces upward

when the sheet is arranged on the bed (8). The second sheet (6) comprises a second surface (16), being a part of the second sheet (6) that faces upward when the sheet is arranged on the bed (8). The first surface (14) and the second surface (16) cover different parts of the bed surface, and border each other along a border line B that at least partly is essentially perpendicular to said axis A. The stretcher arrangement (2) further comprises: a sheet movement unit (18) structured to apply movement to at least one of said first and second sheets (4, 6) essentially along the longitudinal axis A of said bed; a control unit (20) configured to control said sheet movement unit (18), according to a set of sheet movement rules, such that a relative movement between said first surface (14) and said second surface (16) is provided, moving these surfaces apart from each other, resulting in that a stretching movement is applied to a person lying on the sheets.

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Description

TECHNICAL FIELD

The present disclosure relates to a stretcher arrangement, specifically adapted to be arranged on a bed for improving health and well-being and also for treatment of spine and/or joint problems, and also for preventing such problems.

BACKGROUND

The discs between the vertebras in the spine need to have a rest to recover every day. The optimal recovery time is around **12** hours, but most people sleep only 6-8 hours, which thus can lead to back problems due to too short rest for the back. The discs may then be too thin since they have not absorbed enough liquid needed for an active day.

Below is listed some patent documents disclosing various technologies within this technical field.

DE10246760 describes a bed comprising a fixed part for the head and upper torso and a movable part for the bottom and legs. Further, the bed comprises rollers, which pull the movable part away from the fixed part meanwhile the person is sleeping.

US20120265114 shows a stretcher, which is arranged on one side of the upper surface of a bed. The stretcher may stretch the lower body of a person and the stretching may be performed for a whole night during sleep.

JP10023947 shows a health bed comprising a vertebrae stretching mattress. The aim is to be treated while sleeping. The device in this document seems to use pads that are fixed on predetermined places in the mattresses, e.g. under the back.

JP2001333947 shows a machine to stretching out a person's back comprising a sleeping bed which is formed by two parts. The two parts are pivotally connected to each other.

An object of the present invention is to achieve an easy to use arrangement that provides improved therapeutic and recovery effects, and also improved health and well-being, in comparison to the presently known devices.

SUMMARY

The above-mentioned objects are achieved by the present invention according to the independent claim.

Preferred embodiments are set forth in the dependent claims.

The present invention relates to aspects of a stretcher arrangement comprising a first sheet (**4**) and a second sheet (**6**) to be arranged on a bed (**8**) having a first end (**10**) and a second end (**12**), and a length L along a longitudinal axis A.

The first sheet (**4**) comprises a first surface (**14**), being a part of the first sheet that faces upward when the sheet is arranged on the bed (**8**).

The second sheet (**6**) comprises a second surface (**16**), being a part of the second sheet (**6**) that faces upward when the sheet is arranged on the bed (**8**), wherein said first surface (**14**) and said second surface (**16**) cover different parts of the bed surface, and border each other along a border line B that at least partly is essentially perpendicular to said axis A.

The stretcher arrangement (**2**) further comprises:

a sheet movement unit (**18**) structured to apply movement to at least one of said first and second sheets (**4**, **6**) essentially along the longitudinal axis A of said bed;

a control unit (**20**) configured to control said sheet movement unit (**18**), according to a set of sheet movement rules, such that a relative movement between said first surface (**14**) and said second surface (**16**) is provided, moving these surfaces apart from each other, resulting in that a stretching movement is applied to a person lying on the sheets.

Thus, the stretcher arrangement comprises two sheets placed on a bed. Preferably, one sheet is placed on the upper part of the bed and the other on the lower part of the bed. In one embodiment, the sheet arranged on the lower part of the bed is connected to a sheet movement unit comprising a roller. When the person has fallen asleep, and/or the procedure is initiated, the lower sheet will be slowly rolled up at a predetermined variable rolling speed and thus, the spine of the person sleeping/lying in bed will be stretched. A relative movement is thereby provided between the first and second sheets arranged on a bed such that stretching is applied to the person lying on the bed. One important advantage of the stretcher arrangement according to the present invention is that the person lying on the bed does not have to be attached to any attachment means, but only lie on the bed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic illustration of a side view of a stretcher arrangement according to the present invention arranged on a bed.

FIG. 2 is a schematic illustration of a view from above of a stretcher arrangement according to the present invention arranged on a bed.

FIG. 3 is a schematic illustration of a side view of a stretcher arrangement according to one embodiment of the present invention arranged on a bed.

FIG. 4 is a schematic illustration of a view from above of a stretcher arrangement according to one embodiment of the present invention arranged on a bed.

DETAILED DESCRIPTION

The stretcher arrangement will now be described in detail with references to the appended figures. Throughout the figures the same, or similar, items have the same reference signs. Moreover, the items and the figures are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention.

First with reference to the schematic illustrations of FIGS. 1 and 2, a stretcher arrangement **2** is provided, comprising a first sheet **4** and a second sheet **6** to be arranged on a bed **8** having a first end **10** and a second end **12**, and a length L (e.g. **200** or **210** cm) along a longitudinal axis A.

The first sheet **4** comprises a first surface **14**, being a part of the first sheet that faces upward when the sheet is arranged on the bed **8**, and the second sheet **6** comprises a second surface **16**, being a part of the second sheet **6** that faces upward when the sheet is arranged on the bed **8**.

The first surface **14** and the second surface **16** cover different parts of the bed surface, and border each other along a border line B that at least partly is essentially perpendicular to said axis A.

The stretcher arrangement **2** further comprises a sheet movement unit **18** structured to apply movement to at least one of the first and second sheets **4**, **6** essentially along the longitudinal axis A of the bed. The stretcher arrangement also comprises a control unit **20** configured to control the sheet movement unit **18**, according to a set of sheet movement rules, such that a relative movement between

the first surface **14** and the second surface **16** is provided, moving these surfaces apart from each other, resulting in that a stretching movement is applied to a person lying on the sheets. The sheet movement rules comprise at least one of the following rules:

Applying a stretching movement rate: e.g. 1-10 cm per hour, may be variable.

Applying a movement program: periodical movement, e.g. movement e.g. every 0.5 hours.

Starting of program: delay e.g. 20, 40 or 60 minutes.

As one example, one of the first and second sheets is moved and the other is kept still. In FIGS. 1 and 2 a solid arrow is used to indicate that the first sheet **4** is intended to be moved and the second sheet **6** is kept still. The dashed arrow on the second sheet **6** indicates that also this sheet **6** may be moved, at the same time as the first sheet is moved.

Preferably, the first surface **14** and said second surface **16** together cover essentially the entire bed surface.

The border line B is advantageously provided at a position in the range of 0.4-0.6 L. In the figure the border line B is shown approximately at a middle position along axis A, i.e. at 0.5 L. The position of the border line B may be such that a person lying on the bed has his/her waistline approximately on the border line B.

According to one embodiment, which is illustrated in FIG. 3, the sheet movement unit **18** is structured to be arranged in connection with at least one of the first and second ends **10**, **12** of the bed, and comprises at least one roller **22** to be arranged essentially perpendicular to the longitudinal axis A. The control unit **20** is configured to control the rotation of the at least one roller **22**, such that at least one of the first and second sheets **4**, **6** is slowly wound up on the at least one roller **22**, resulting in that the first and second surfaces slowly move in relation to each other.

The roller **22** is driven by an electrical motor having a capability of generating the necessary force to apply the stretching movement to the sheet. The rotational force needed to be applied by the motor is dependent upon the weight of the person lying on the sheets. The motor is thereby configured to generate a variable output torque in dependence of the weight, The weight may be manually entered to the control

unit, or may be indirectly determined by measuring the current consumed by the motor.

In the figures only one sheet movement unit is shown. Naturally, another sheet movement unit, including a roller may be arranged at the opposite end of the bed being adapted to apply movement to the other sheet.

Furthermore, herein the sheet movement unit is exemplified to comprise a motor and a roller. Naturally, other means to provide movement to the sheet(s) may be considered, e.g. an elastic force generating arrangement provided to generate movement force to the sheet(s).

According to another embodiment, the first sheet **4** is configured to be arranged on the bed **8** and to extend from one of the first and second ends **10**, **12** of the bed **8**, and the second sheet **6** has a length that covers a predetermined part of the bed **8**. The predetermined part may be in the range of 30-70%, and more preferred 40-60%, e.g. 50%, of the entire bed area. The second sheet **6** is configured to be arranged on the first sheet **4** such that it covers, i.e. overlaps, at least a part of the first sheet **4**, and to extend from the other of said first and second ends **10**, **12** of the bed.

The sheet movement unit **18** is structured to apply a movement to the first sheet **4** such that it is moved in a direction away from the other of said first and second ends **10**, **12** of the bed.

In a further embodiment, illustrated in FIG. 3, a first short side **24** of the first sheet **4** is provided with an elastic attachment member **26** structured to be attached to an attachment arrangement **28** configured to be arranged in connection the other of the first and second ends **10**, **12** of the bed. Thereby the first sheet **4** is remained stretched during the slow movement applied by the sheet movement unit **18**, and also, when the movement procedure has been finalized and the person has left the bed, the first sheet **4** may return to its initial position by forces applied from the elastic attachment member **26**, i.e. move to the right in FIG. 3. The elastic attachment member **26** may comprise a number of flat, flexible and elastic bands, e.g. rubber bands.

Preferably, the second sheet **6** has a first short side **30** provided with a second sheet attachment member **32** structured to be attached to the attachment arrangement **28** such that the second sheet **6** is arranged on top of the first sheet **4**, and remains in its position during movement of the first sheet **4** (to the left FIG. 3).

According to another embodiment, at least one of the first and second sheets **4**, **6** is provided with a low frictional material on the side(s) facing downward when the sheets are arranged at the bed. This low frictional material may e.g. be a Teflon-like material, or a silk material. This feature will further facilitates easy movement of the sheet as the friction to the underlying upper surface of the bed is reduced.

According to still another embodiment, and with references to FIG. 4, at least one of the first and second sheets **4**, **6** is provided with one or many elastic sections **34**, and wherein an elastic section has a higher elasticity along axis A in comparison to non-elastic sections **36** of the at least one of said first and second sheets **4**. **6**, It is then possible to tailor the sheet(s) to a person's specific needs. For example, it may then be advantageous to position the sheet such that one elastic section essentially is positioned where the person's knees are lying if the person has knee problems. During movement of a. sheet the non-elastic sections **36** will move apart from each other.

The control unit **20** is configured to control the sheet movement unit **18** and is configured to receive user input via a user input interface. The user input interface may be integrated into the control unit or attached to the control unit via a wire. As an alternative a remote input interface may be provided, e.g. as a remote control unit, configured to communicate with the control unit via a wireless interface, e.g, via an infrared (IR) communication protocol, via Bluetooth, or via an interact protocol. The remote input interface may also be an application program downloaded on a smartphone. The user input interface facilitates the user to easily choose any available movement rule and set a plurality of different parameters in order to tailor the movement to his/her specific needs.

The present invention is not limited to the above-described preferred embodiments. Various alternatives, modifications and equivalents may be used. Therefore, the above embodiments should not be taken as limiting the scope of the invention, which is defined by the appending claims.

Claims

1. A stretcher arrangement comprising a first sheet and a second sheet to be arranged on a bed having a first end and a second end, and a length L along a longitudinal axis A,

the first sheet comprises a first surface, being a part of the first sheet that faces upward when the first sheet is arranged on the bed,

the second sheet comprises a second surface, being a part of the second sheet that faces upward when the second sheet is arranged on the bed, wherein said first surface and said second surface cover different parts of the bed surface, and border each other along a border line B that at least partly is essentially perpendicular to said axis A,

wherein said stretcher arrangement444 further comprises:

a sheet movement unit structured to apply movement to at least one of said first and second sheets essentially along the longitudinal axis A of said bed;

a control unit configured to control said sheet movement unit, according to a set of sheet movement rules, such that a relative movement between said first surface and said second surface is provided, moving these surfaces apart from each other, resulting in that a stretching movement is applied to a person lying on the sheets.

2. The stretcher arrangement according to claim 1, wherein said first surface and said second surface together cover essentially the entire bed surface.

3. The stretcher arrangement according to claim 1, wherein said border line B is provided at a position in the range of 0.3-0.7 L, preferably 0.4-0.6 L.

4. The stretcher arrangement according to claim 1, wherein said sheet movement unit is structured to be arranged in connection with at least one of said first and second ends of said bed, and comprises at least one roller to be arranged essentially perpendicular to said longitudinal axis A, wherein said control unit is configured to control the rotation of said at least one roller, such that at least one of said first and second sheets is slowly wound up on said at least one roller, resulting in that said first and second surfaces slowly move in relation to each other.

5. The stretcher arrangement according to claim 1, wherein the first sheet-(4) is configured to be arranged on said bed and to extend from one of said first and second ends of the bed, and the second sheet has a length that covers a predetermined part of said bed, and that said second sheet is configured to be arranged on said first sheet such that it covers at least a part of said first sheet, and to extend from the other of said first and second ends (10, 12) of the bed.

6. The stretcher arrangement according to claim 5, wherein said first sheet is moved in a direction away from the other of said first and second ends of the bed.

7. The stretcher arrangement according to claim 5, wherein a first short side of said first sheet is provided with an elastic attachment member structured to be attached to an attachment arrangement configured to be arranged in connection the other of said first and second ends of said bed.

8. The stretcher arrangement according to claim 7, wherein the second sheet has a first short side provided with a second sheet attachment member structured to be attached to said attachment arrangement such that said second sheet is arranged on top of said first sheet.

9. The stretcher arrangement according to claim 1, wherein at least one of said first and second sheets is provided with a low frictional material on the side(s) facing downward when the sheets are arranged at the bed.

10. The stretcher arrangement according to claim 1, wherein at least one of said first and second sheets is provided with one or many elastic sections, and wherein an elastic section has a higher elasticity along axis A in comparison to non-elastic sections of said at least one of said first and second sheets.

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JUSTIA

Banknote dispensing apparatus

Apr 11, 1980 - Inter Innovation AB

A currency dispensing apparatus has a plurality of customer receipt openings to which an ordered number of banknotes can be sent from a store of banknotes in response to an order signal. The banknotes are dispensed to a collector station through a first feed mechanism in response to the transmitted order signal, and from the collector station to a selected receipt opening by a second

feed mechanism which cooperates with a switching device for determining the direction of feed of the second feed mechanism.

Latest Inter Innovation AB Patents:

- Lockable cassette for the storage of valuable documents or valuable articles
- Arrangement for correctly feeding thin objects, such as banknotes, cheques, etc.
- Arrangement for the infeed and outfeed of valuable documents
- Sheet feeding apparatus having a stack advancing plate and plate locking spring element
- Sheet stacking apparatus

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Description

The present invention relates to a dispensing apparatus, and more particularly, although not exclusively, to an apparatus for dispensing banknotes in such localities as banks, postoffices, hotels etc.

Although the invention is directed to and described with reference to an apparatus for dispensing an ordered number of banknotes, it will be understood that the apparatus can also function to dispense any suitable sheet-like elements.

Sheet dispensing apparatus, such as currency dispensing apparatus for dispensing an ordered number of banknotes from a store thereof to a banknote receiving station are known to the art.

These known apparatus, however, are designed and constructed to serve only a single banknote receiving station, thus restricting the use of such apparatus to one customer at a time.

It is therefore an object of the invention to provide apparatus able to serve a plurality of customer receipt openings, thereby enabling more than one customer to

use the apparatus at any time.

Accordingly the invention consists in a dispensing apparatus for dispensing an ordered number of banknotes from a banknote storage means to a customer, said apparatus comprising

(a) a plurality of customer receipt openings;

(b) means for ordering a given number of banknotes to be dispensed from the storage means to a selected one of said customer receipt openings;

(c) first feed means co-operating with said ordering means to feed said ordered number of banknotes to a collective station;

(d) second feed means co-operating with said first feed means to feed the banknotes located in the collector station to the selected customer station, said means co-operating with switching means for determining the direction of feed of said second feed means; and

(e) electronic devices for controlling the sequence of dispensing operations.

FIG. 1 illustrates an apparatus according to the invention having two receipt openings,

FIG. 2 is a circuit diagram showing the various electric components of apparatus constructed in accordance with the invention,

FIG. 3 illustrates an apparatus according to the invention having four receipt openings, and

FIGS. 4 to 6 illustrate a further apparatus according to the invention having two receipt openings and two banknote collector means arranged for movement towards and away from said means.

By receipt opening is meant that receiving station to which a given number of banknotes are dispatched as a result of instructions given to the apparatus.

The apparatus illustrated in FIG. 1 is intended for dispensing banknotes from a bundle 10 of banknotes to each of two receipt openings 11,12, forming part of said apparatus. The apparatus comprises first banknote conveying means 13,14 effective to convey banknotes from the bundle 10 to a banknote collector 15, and second

conveying means 16-17 and 16-18 respectively effective to convey the banknotes from the collector 15 to a respective one of the receipt openings 11 and 12. More specifically, the first banknote conveying means 13-14 comprises two mutually-coacting endless belts 34 and 35 between which the banknotes are fed one at a time to two rollers 14 mounted on a common shaft, said rollers being arranged to rotate counterclockwise in a manner such as to convey the banknotes, one at a time, to the collector 15. The banknotes are fed from the bundle 10 by means of a dispensing wheel 31 arranged to dispense one banknote from the bundle 10 with each revolution. The dispensing roller 31 is mounted on a shaft 32 driven by a motor 33, as shown in FIG. 2. It should be mentioned here that the drawing is purely schematical and is intended only to illustrate the principal construction and operation of the apparatus. Thus, for example, the collector 15 of the FIG. 1 embodiment is not shown to have walls, but the reference 15 merely shows where said collector is located in relation to other elements of the apparatus. The collector 15 is provided in the illustrated embodiment, with a swingable, rectangular bottom 47 mounted on a shaft 48. When the ordered number of banknotes is dispensed correctly from the bundle 10, the bottom 47 is arranged to be held in a substantially, horizontal, note-receiving position by means of a spring 49. (FIG. 2). If, for some reason, more than one banknote is dispensed from the bundle 10 at the same time, the bottom 47 is arranged to swing down into a substantially vertical note-reject position by means of an electric drive means 50, whereupon the banknotes fall into a reject-receptacle 19 located beneath said bottom. It will be understood that the banknotes are fed to the collector 15 so oriented that they are able to pass readily through the receipt openings 11,12 when fed thereto.

The collector 15 can also be said to comprise part of said second conveying means, which said part also includes an endless belt 16 mounted on rollers 44 and 45 having substantially vertical axes, of which rollers one, 44, is driven by means of a reversible motor 46 (FIG. 2), such that the direction of rotation of the rollers 44,45 can be changed in dependence upon the direction in which the banknotes are to be fed, i.e. whether the banknotes are to be fed to the receipt opening 12 or the receipt opening 11. Arranged between the collector 15 and the receipt opening 12 and receipt opening 11 are further conveying means 18 and 17 respectively. Each of these further conveying means comprises two mutually co-acting endless belts. The banknotes are conveyed from the collector 15 to the receipt opening 11 by means of the belt 16 and the further conveying means 17, and to the receipt opening 12 by means of the belt 16 and the further conveying means 18, the sequence of

operations being controlled electronically in a manner hereinafter described with reference to FIG. 2.

Referring now to FIG. 2, it will be seen that the shaft 32 of the banknote dispensing roller 31 is driven by a motor 33 which is energized by means of a signal sent thereto by a start-feed circuit 57 over an electrical conductor 58. The signal sent from the circuit 57 over the conductor 58 also activates a drive motor 38 which causes the driven rollers 36,37 to rotate, thereby dispensing banknotes to the rollers 14. Arranged in the feed path of the banknotes dispensed from the bundle 10 are pairs of detecting means 39,40 which may have the form of optosensors, each being arranged to send a lightbeam through a note travelling between the belts 34,35, and to emit an electric signal having a first value, e.g. a value of 10 volts, when a single note is located between the belts, and a signal having a second value, e.g. a value of 5 volts, when two banknotes are located between the belts at the same time.

(The first signal is hereinafter referred to as the counting signal, while the second signal is referred hereinafter as the signal.)

These signals are sent to an error and counter circuit 53 over conductors 59 and 60 in a manner hereinafter made apparent. Although not shown in FIG. 1, there is located between the rollers 14 and collector 15 a spring-biassed drive means in the form of a press roller 41. The roller 41 is mounted on a substantially horizontal shaft 65 to which there is connected a drive means 43, e.g. an electric-magnetic drive device. While banknotes are being dispensed from the bundle 10 to the collector 15, the press roller 41 is rotated to a position outside the path of said banknotes and held in said position by means of the drive device 43. Subsequent to the ordered number of banknotes being dispensed, the drive device 43 is de-energized and the press roller swung to a substantially vertical position by means of a spring 42.

As beforementioned the collector 15 comprises a rectangular bottom 47 pivotally mounted on a shaft 48, to which there is connected a drive means, e.g. a motor 50. When banknotes are being dispensed from the bundle 10, the bottom 47 is held in a note-receiving position, e.g. a substantially horizontal position by means of a spring 49.

The receipt opening 12 is arranged to co-operate with a keyboard 52 while the receipt opening 11 is arranged to cooperate with the keyboard 51. Each of the keyboards 51,52 is connected to the error and counter circuit 53 through electrical conductors 54,55 respectively. The keyboards 51,52 are also connected through a

respective electrical conductor 63,64 with a left-right output circuit 56, which is also connected to the error and counter circuit through an electrical conductor 62, and which is operative in causing the roller 44 to rotate in the appropriate direction.

The embodiment illustrated in FIG. 1 has the following mode of operation, reference being made at the same time to FIG. 2. When wishing to draw money from an account through the illustrated apparatus, the user punches the desired sum into either the keyboard 51 or the keyboard 52. Since, the sequence of electrical operations are identical with respect to both keyboards, the following description will be made solely with reference to keyboard 51, i.e. the keyboard serving the receipt opening 11, i.e. the receipt opening shown to the right of FIG. 1.

A signal corresponding to the ordered number of banknotes is sent from the keyboard 51 through the conductor 54 to the error and counter circuit 53, in which said number is stored in a counter, (not shown) incorporated therein, which counter may be of any suitable design. A signal is then sent to the start feed circuit means 57 over an electric conductor 67, informing that the dispensing of banknotes from bundle 10 can commence. A signal is then sent from the start-feed circuit 57 to the motor 33 which causes the dispensing roller 33 to rotate, and also to the motor 38 which is then energized to rotate the rollers 36,37 of the feed means 34 and 35 respectively. At the same time a signal is sent from the error and counter circuit to the drive means 43 over an electric conductor 60, causing the shaft 65 to be rotated so that the press roller 41 lies out of the path of the dispensed banknotes. As mentioned, the rectangular bottom 47 is held in its horizontal banknote-receiving position by the spring 49. The presence of each banknote dispensed through the belts 34,35 is detected by the detecting means 39,40 and a signal is sent from said detecting means through respective conductors 60, 59 to the error and counter circuit 53. When the counter in said circuit has been counted down to zero, a signal is sent from said error and counter circuit to the start feed circuit causing the motors 38 and 33 to be stopped, so that no further banknotes are dispensed. Subsequent to dispensing the ordered number of banknotes to the collector 15, a signal is sent from the error and counter circuit to the drive means 43 over conductor 60, causing said drive means to be de-energized, so that the press roller 41 can be raised to an upright position in engagement with the banknotes in said collector by said spring 42. At the same time, a signal is sent from said error and counter circuit to the left-right output circuit 57, which upon receipt thereof sends a signal to the reversible motor 46. Since the banknotes were assumed to be ordered through the keyboard 51, i.e. the keyboard which serves the receipt opening 11, the

signal sent to the reversible motor 46 will cause the roller 44 to be rotated in a direction such that the banknotes in collector 15 are fed to the second feed means 17 and from there to said receipt opening 11. It will be understood that if the banknotes were ordered through keyboard 52, the direction of the motor 46 will be reversed so that the roller 44 is rotated in direction such that the banknotes in collector 15 are fed to the second feed means 18 and from there to the receipt opening 12.

If, for some reason or other, more than one banknote at a time is fed to the belts 34,35 by the roller 31, this will be detected by the detectors 39,40, and an error signal having said second value of 5 volts will be sent to the error and counter circuit 53, from which a signal is then sent from said circuit to the drivemeans 50 causing the rectangular bottom 47 to be swung down into a substantially vertical position against the spring 49, thereby permitting banknotes to fall into the reject receptacle 19.

The apparatus illustrated in FIG. 3 comprises the elements 10,13,14,15,16 and 19 illustrated in FIG. 1 and, in addition hereto, two path-determining means 25,26 and further conveying means 27,28,29,30 forming part of the second conveying means. The path-determining means 25,26 are arranged to move between two given positions 25',25" and 26',26", respectively, these positions determining to which of the four possible receipt openings 21,22,23,24 a bundle of banknotes is despatched. Thus, when the means 25 occupies the position 25' as shown in FIG. 2 banknotes are conveyed from the collecting chamber 15 to the receipt opening 21 by means of the belt 16, the path-determining means 25 and further conveying means (the belt) 27. When the means 25 occupies the position 25", the banknotes are conveyed instead to the receipt opening 22, by means of the belt 16, the path-determining means 25' and further conveying means (the belt) 28.

By reversing the direction of rotation of the belt 26 (to a counterclockwise rotation) the bundle of banknotes can be conveyed in an analogous manner, instead to the receipt opening 23, by moving the path-determining means 26 to the position 26', or to the receipt opening 24, by moving the path-determining means to the position illustrated at 26". All sequences of operations are, as beforementioned, controlled electronically.

As will be seen from FIG. 3 the dispensing of banknotes from the bundle 10 to the receipt openings 23,24 is governed by a respective keyboard 73,74 through a I/II circuit 90 connected electrically to keyboard 73,74 by electric conductors 93,92, while the dispensing of banknotes from said bundle to the receipt openings 21,22 is

governed through a III/IV circuit 91 connected to keyboards 71,72 over conductors 81,80 respectively. As will be seen from FIG. 3, keyboards 74,73 are also referred I and II respectively, and keyboards 72,71 are also referenced III and IV respectively, hence the designation I/II circuit and III/IV circuit. The circuit 3 of the FIG. 3 embodiment also includes a left-right output circuit (here referenced 75) which is connected to the respective keyboards 71,22,73,74 by conductors 79,78,92 and 93 respectively. The left-right output circuit is also connected electrically to the I-II circuit 90 and to a III-IV circuit 91 by conductors 76,78 respectively, as shown in the Figure. As will be seen from the Figure, the I-II circuit is connected to a reversible motor 68 arranged to switch the position of the path-determining means 26, in dependence upon which of the keybanks 74,73 has been used, i.e. in dependence upon whether the banknotes shall be fed to the receipt opening 24 or the receipt opening 23. Similarly, the III-IV circuit is connected, over a conductor 69, with a reversible motor 70 arranged to switch the position of path-determining means 25 so that the ordered number of banknotes in the collector 15 is dispensed to the appropriate receipt opening 21 or 22. Although not specifically shown in FIG. 3, it will be understood that this embodiment may also include the circuitry of the FIG. 2 embodiment to ensure that in the case of double feeding the banknotes in collector 15 will be discarded into the banknote reject receptacle 19.

FIGS. 4, 5 and 6 illustrate schematically and partly in perspective an alternative embodiment of a banknote dispensing apparatus. As with the previous embodiments, an ordered number of banknotes is dispensed from a bundle 10 thereof by means of a driven roller 31 arranged such that one banknote is dispensed to the first conveying means 13,14 each time the roller 31 rotates. Also present in the FIG. 4 embodiment are the pairs of detecting devices 39,40, which have the same function of the detecting devices described with reference to the earlier embodiments. In this embodiment, however, the collector 15 of the earlier described embodiment is replaced by movable collector chambers, the illustrated embodiment having two such chambers. As shown in the Figures, the collector chambers, here referenced 82,83, are mechanically connected together by means 84 so that when one collector chamber, e.g. 83, is located in the banknote collecting station in register with the rollers 14, the other collector chamber 82 is located in a receipt opening, e.g. the receipt opening 12. Each of the chambers 83,82 comprises two side walls, of which one, 86, is collapsible so that it can be lowered out of the path of banknotes dispensed to the collector chamber and subsequently raised into engagement with said banknotes to form a compact sheaf which can be transported neatly to the respective receipt opening. In order to allow the feed rollers 14 to be

located as close to the collecting station as possible, the collapsible wall 86 has a curved cut-away portion 100 and a slotted portion 101 in which the roller shown to the right of FIG. 4 can rotate. The dispensing of banknotes to a respective receipt opening, e.g. at the position occupied by collector chamber 82 in FIG. 4, is governed through a respective keyboard 88,87. Each of the keyboards is connected electrically over conductors 102,103 only to circuit means 89 similar to that of the FIG. 2 embodiment, said circuit means being shown very schematically. As will be understood, the direction in which a respective collecting chamber is driven is governed by a reversible drive motor, here referenced 85. As will be seen from FIGS. 5 and 6, which show the apparatus from a direction opposite to that of FIG. 4, the wall 86 of respective collector chambers 82,83 is lifted into an upright position by means of a collapsible press roller 41 similar to the press roller of the FIGS. 1 and 2 embodiment. Arranged along the path of movement of respective collector chambers are drive rollers 41a,41b and 41c,41d, respectively which are connected to the reversible drive motor 85 and which are operative in moving a collecting chamber to one or the other of the receipt opening, depending on the direction of rotation of the motor 85.

As beforementioned the collector chambers 82,83 are mechanically connected together so that as one collector chamber is moved to its respective receipt opening, the other is moved into register with the banknote collecting station. It will be seen from this that subsequent to using the keybank 87 the collector chamber 82 will remain located in its associated receipt opening, while the collector chamber 83 associated with the keybank 88 will be located in register with the banknote collecting station. Thus, unless measures are taken, if the next order is given through keybank 87, the banknotes dispensed by roller 31 will be fed to the chamber 83 associated with keyboard 88. To overcome this, and to ensure that the chamber registered in the banknote collecting station, is that belonging to the keybank through which the order was placed the circuitry means 89 is also connected to a microswitch 104 which is actuated by a respective collector chamber 82 during its passage towards its associated receiving station. Thus, when an order is given through a respective keybank 87,88, a signal is sent to the position detecting means 85 which checks whether the banknote receiving opening of the relevant keyboard is free or occupied. If the receiving opening is free, dispensement of the banknotes takes place in the aforedescribed manner. If, on the other hand, the receipt opening is occupied, a signal is sent to the circuitry means which causes the collapsible wall of the chamber occupying the collector station to be raised and said collector chamber to be moved into its associated receipt opening, thereby causing

the other collector chamber to be moved into register with the rollers 14, the collapsible wall of said chamber falling down, either gravitationally or by means of a spring force. Subsequent to a given delay, the motors to the drive means 13 and the dispensing roller 31 are energized so that feeding of the banknotes can commence. As will be understood the spacing of the rollers 41a,41b,41c and 41d is such that the collapsible wall is held in its upright position during the whole of the travel of respective chambers from the collecting station to the associated receipt opening.

Claims

1. An apparatus for dispensing an ordered number of banknotes from a banknote storage means to a customer, said apparatus comprising:

(a) a plurality of customer receipt openings;
(b) means for ordering a given number of banknotes to be dispensed from the storage means to a selected one of said customer receipt openings;
(c) first conveying means co-operating with said ordering means for feeding said ordered number of banknotes to at least one collector station;
(d) second conveying means co-operating with said first conveying means for feeding the banknotes located in the collector station to the selected customer station;
(e) switching means responsive to said ordering means for determining the direction of feed of said second conveying means such that said ordered number of banknotes is fed to the selected one of said customer receipt openings; and
(f) electronic devices for controlling the sequence of dispensing operations.

2. An apparatus according to claim 1, characterized in that the collector station comprises part of said second conveying means, said part being arranged to move a bundle of banknotes present in said station in a given one of two directions to a selected one of two further conveying means, banknotes being conveyed from the collector station to a selected one of two receipt openings by means of the second conveying means and one of the two further conveying means, or to the other of said receipt openings by means of the second conveying means and the respective one of said further conveying means.

3. An apparatus according to claim 1, characterized in that the collector station comprises part of said second conveying means, said part being arranged to move a bundle of notes in said station in a given one of two directions to one of two further conveying means and in that switch means are arranged in a respective one of the two paths along which the banknotes are moved by said part of said second conveying means, each of said switch means being movable to one of two positions such that said bundle of banknotes can be transferred from said collector station to a selected one of four receipt openings.

4. An apparatus according to claim 1, in which two mutually identical collector stations form part of said second conveying means, said collector stations being mechanically coupled together, and the said second conveying means being arranged for movement in a given one of two directions in a manner such that one of the collector stations is moved to an associated receipt opening while the other of said collector stations is moved to the output side of the first conveying means, and vice versa.

5. An apparatus according to claim 4, comprising means for checking that two banknotes have not been fed from said storage means simultaneously, characterized in that each of the two collector stations is provided with a respective openable bottom so arranged that, when in a position adjacent the output side of the first conveying means and subsequent to receiving a signal from said checking means, the collector station opens to permit banknotes present therein to fall from said collector station to an internal storage chamber.

6. An apparatus according to claim 4, characterized by a bundling device arranged at the output side of the first conveying means for arranging the banknotes present in said collecting station at said output side into a neat bundle; and by further, corresponding bundling means arranged at the two receipt openings and constructed such that when the second conveying means is moved in either of said two directions they co-operate with the first mentioned bundling means in a manner such as to arrange the sheet-like elements into a neat bundle during transport to respective receipt openings.

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Assistant Examiner: Terrance L. Siemens
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Current U.S. Class: **414/32;** 414/43; 414/104; 414/107; 414/330; With Movable Diverter (271/303); By Distributing Items From One Stream Into Plural Streams (198/436); By Passive Material-diverting Means Placed Across The Flow Path (198/367)
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EKONOMI

Uppfinnare köper del av Compaq

Publicerad 1999-03-24

Entreprenören och uppfinnaren Leif Lundblad har köpt Digital Equipment BCFI AB, en del av Compaq. Järfällaföretaget har 160 anställda och omsätter omkring 400 miljoner kronor. Det nya företaget får namnet Banqit AB, och ska syssla med IT-produkter för bankautomation. Köpeskillingen är inte känd. TT

Text

TT

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JUSTIA

Dispensing apparatus

Apr 4, 1980

An apparatus for dispensing sheet-like elements from a store of such elements to a receipt opening comprises an element-dispensing control circuit; first, second and third element-conveyors having respective drives electrically connected to said control circuit for controlling the respective operating sequences of said conveyor drives, said second conveyor being vertically movable

towards and away from said third conveyor; and a counter for counting the number of elements dispensed from said store in response to an ordered number of said elements. The drive of the first conveyor is arranged, in cooperation with the control circuit, to dispense a given number of sheet-like elements to the second conveyor in dependence upon the absence of a previously dispensed bundle of elements on the second conveyor but independent of the presence or absence of previous conveyed bundle of elements in the receipt opening; and the drive of the second conveyor is arranged, in cooperation with the control circuit, to transfer the elements to the third conveyor in dependence upon the absence of a previously further conveyed bundle of elements in the receipt opening. In this way feeding of the sheet-like elements from said store to the receipt opening can commence during that time in which a previously conveyed bundle of elements still remains in the receipt opening.

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Description

The present invention relates to a dispensing apparatus, and more particularly to an apparatus for transferring a given number of sheet-like elements from a store of such elements to a receipt opening.

Although dispensing apparatuses are known to the art in which one and the same apparatus is able to serve a plurality of receipt stations, there is a need for an apparatus which is able to serve one and the same receipt station in response to orders given by a plurality of separate customers.

Consequently, the object of the present invention is to provide an apparatus by means of which sheet-like elements, such as banknotes, can be dispensed in banks or postoffices to a receipt opening in a manner which is both positive and quick. By "in a positive manner" is meant here a dispensing operation which is correct both with regard to the number of banknotes dispensed and the sequence in time at which said banknotes are dispensed relative to an earlier initiated dispensing operation to be effected through the said receipt opening. By a "quick manner" is meant that the possibilities of preparing for a dispensing operation while earlier ordered dispensing operations are carried into effect and banknotes dispensed to said receipt opening are utilized to a maximum, i.e. any delay in the final stage of a dispensing operation is compensated for, as far as possible, by the preparation of a dispensing operation ordered at a later point of time.

This object is realized in accordance with the invention with an apparatus for feeding a given number of sheet-like elements from a store of such elements to a receipt opening, which comprises an element-dispensing control circuit; first, second and third element-conveying means having respective drive means electrically connected to said control circuit for controlling the respective operating sequences of said drive means, said second conveying means being vertically movable towards and away from said third conveying means; and counter means for counting the number of elements dispensed from said store in response to an ordered number of said elements, wherein the drive means of the first conveying means is arranged, in cooperation with said control means, to dispense a given number of sheet-like elements to the second conveying means in dependence upon the absence of a previously dispensed bundle of elements on the second conveying means but independent of the presence or absence of previous conveyed bundle of elements in the receipt opening; and wherein the drive means of the second

conveying means is arranged, in cooperation with said control means, to transfer the elements to said third conveying means in dependence upon the absence of a previously further conveyed bundle of elements in the receipt opening, whereby feeding of said sheet-like elements from said store to said receipt opening can commence during that time in which a previously conveyed bundle of said elements still remains in the receipt opening, thereby enabling the dispensing procedure to be considerably expedited.

So that the invention will be more readily understood and further features thereof made apparent, an exemplary embodiment of the invention will now be described with reference to the accompanying schematic drawing, in which

FIG. 1 illustrates a dispensing apparatus according to the invention in side view having a first and a second conveying means, said second conveying means being shown one position of its operation,

FIG. 2 illustrates the apparatus of FIG. 1 in side view with the second conveying means located in another position of its operation, and

FIG. 3 illustrates a device arranged to cooperate with the receipt opening of the apparatus shown in FIGS. 1 and 2 in a manner such as to enable banknotes to be withdrawn readily from only one side of said opening.

The apparatus illustrated in FIGS. 1 and 2 comprises three banknote-conveying sections, these being a first section comprising a pair of pick-up rolls 10 and a bladed pick-up device 11; a second section comprising a substantially vertically movable table 12 having a bottom surface onto which banknotes conveyed by the first conveying section are stacked, as shown at 15, on their short edges so as to extend vertically; and a third section comprising a pair of rollers 13 which are driven continuously in mutually opposite directions of rotation by a drive means 64, and which are located immediately beneath a receipt opening 14 and are arranged to grip the banknotes on the table 12 as said table is lifted vertically, to feed said banknotes into and through said opening 14, as illustrated in FIG. 2. The second conveying section, i.e. the table 12 is movable between a location of communication with the first conveying section 10, 11 (FIG. 1) and a location of communication with the third conveying section 13 (FIG. 2), the bundle of banknotes 15 being supported during upward movement of the table 12 by a support means 33 and a finger 18, in a manner described in more detail hereinafter. The table is also arranged for

movement to a third location in which the table 12 is caused to swing down to a substantially vertical position, for a purpose hereinafter described.

The rollers 10 of the first conveying section are mounted for rotation on shafts which extend parallel with one another, at least one of which shafts is driven by a motor 45 which is connected to an error and counting circuit 46, which may be implemented with any of a number of well-known microprocessors through an electrical conductor 47, and also to the rotatable shaft of the wheel 11, through a conductor 63. The rollers are arranged to rotate so that for each revolution of said rollers one banknote at a time is dispensed from the store. Arranged in the path of the banknotes between the rollers 10 and the pick-up device 11 is a pair of mutually cooperating detecting means 55, which may have the form of opto sensors, and which are arranged to send a light-beam through a banknote being dispensed by the rollers 10. The sensors 55 are connected to error and counter circuit 46 through an electric conductor 56 and are arranged to emit an electric signal having a first value, e.g. a value of 10 volts, when a single note is being fed out through the rollers, and a second value, e.g. a value of 5 volts, when more than one note at a time is being dispensed.

The pick-up device 11 comprises at least one pair of bladed wheels mounted for rotation on a common shaft 48, which is driven by motor 45 simultaneously with the rollers 10. The spacing between the wheels shall be sufficient to reliably support and carry a banknote between mutually adjacent pairs of blades on said wheels. Each of the wheels comprises a multiplicity of curved blades 49 extending radially from the hub of said wheel, mutually adjacent ones of said blades being arranged to receive therebetween a banknote fed thereto by the rollers 10. It will be understood that, in response to instructions given to the apparatus (in a manner hereinafter described), an ordered number of banknotes is taken from the store of banknotes are and the banknotes fed one at a time by the rollers 10 into a respective space between adjacent ones of said blades, i.e. one space contains one banknote. The shape of the blades 49 is such that as the blades pass the table means 12, the banknotes present between said blades slide out onto said table.

The finger 18 forms part of a clearing and holding device which is pivotally mounted at 19 and which is intended to be swung up between the pair of wheels 11 in a manner to clear the wheels of the last of the given order of banknotes and to hold the banknotes in an ordered stack during their passage to the rollers 13. This position of the finger 18 is referenced 18' in FIG. 2.

As shown in FIG. 1, the finger 18 is raised and lowered by means of a respective link system, generally shown in ghost lines at 34 and comprising a first arm 35 which is fixedly connected at one end thereof to the pivot centre of the finger 18, while the other end of said arm is pivotally connected to a further, longer arm 36. Rotatably mounted on the free end of the arm 36 is a cam-follower 37, which is arranged to run around the periphery of an eccentric camming roller 38. The roller 38 is driven by a reversible motor 50, which is connected to the error and counter circuit 46 by an electric conductor 51.

It will be understood from this, and from FIG. 1, that when the camming roller is rotated in an anti-clockwise direction, the link arm 36 will be caused to move upwards by the cam-follower 37, thereby causing the finger 18 to pivot about its pivot axis, to the position shown in FIG. 2, in which it assists in guiding the banknotes towards the rollers 13, while holding said banknotes in a neat and compact stack. Preferably, the finger 18 is of a length such that in its raised position it terminates just short of rollers 13. Also, the end part of the finger 18 and that part of the support means 33 located in the vicinity of the rollers 13, are arranged so as to extend substantially parallel to one another in said raised position of the finger 18.

Vertical movement of the table 12 is effected by means of a drive arrangement generally shown at 39. In the illustrated embodiment, this drive arrangement comprises a first pulley 40 and a second, double pulley 41 arranged at a given distance beneath said first pulley. Arranged beneath the second pulley 41 is a third pulley 43 which is driven by a reversible motor 52. The pulley 43 drives the pulley 41 by means of a drive belt 44.

As will be seen from FIG. 1, the table 12 is attached at a location close to the end thereof remote from the roller 10 to the belt 42 in a manner which enables the table 12 to pivot in one direction only, i.e. to the substantially vertically depending position 12' shown in ghost lines, for a purpose hereinafter disclosed.

Arranged at said end of the table 12 is a counter-weight 53 which assists in lifting the table 12 from the substantially vertical position 12' to its horizontal position. Pivoting of the table 12 in an upwards direction is prevented by a stop 54.

Adjacent the receipt opening 14 is a monitoring means 21-22, which in the shown embodiment comprises a lamp 21 and a photocell 22, and which is connected to the reversible motor 52 and to the error and counter circuit 46 through electrical conductors 57 and 58 respectively.

The illustrated currency dispensing apparatus has the following mode of operation.

When wishing to withdraw money from the store of banknotes (not shown), the sum desired is punched into one of the two illustrated keyboards 59,60, e.g. keyboard 59, through respective conductors 61 and 62. In response hereto, a signal is sent from the keyboard 59 through the conductor 61 to the error and counter circuit 46, in which said number is stored in a counter (not shown) incorporated therein, which counter may be of any suitable design. If the counter is in its zero state, a signal is then sent through conductor 47 to the motor 45, causing the wheel 11 and the rollers 10 to be rotated in response thereto.

As each note is dispensed through the rollers 10, the presence of said note is detected by the sensors 55 and a signal, e.g. corresponding to said first value of 10 volts, is sent to the circuit 46 through the conductor 56. Each of the notes dispensed is deposited between two mutually adjacent blades 49 on the wheel 11. As the wheel rotates, it reaches a position in which the banknote begins to slide out from between the blades 49. Upon further rotation of the wheel, this sliding of the banknote becomes progressively more pronounced, until said banknote protrudes from between the blades to an extent such that it bends down over the extremities of the blades and drops onto the table 12.

When the counter in the error and counter circuit 46 has counted down to zero, a signal is sent from said circuit to the motor 50 through the conductor 51, causing the camming roller 38 to rotate. A signal is also sent at the same time to the motor 52, which is programmed to rotate the pulley 43 after a brief delay of some milliseconds.

The motor 50 is arranged to rotate the roller 38 through one revolution, thereby to raise the finger 18 to the position 18'. As the finger rises it passes between the uppermost blades 49 on the wheel 11 and sweeps the banknote or banknotes remaining between respective blades into the stack of notes on the tables 12.

This lifting of the finger 18 can be arranged to take a time of some milliseconds, after which time the motor 52 causes the pulley 43 to rotate and the table 12, with the banknotes thereon, to be lifted towards the rollers 13. The distance from the table 12 in its FIG. 1 position to a position in which the banknotes can be gripped by rollers 13 can readily be calculated, taking into account the length of the banknotes, and thus the number of revolutions which the motor 52 must make to return the table to the FIG. 1 position can also be readily calculated. In the illustrated

embodiment the motor 52 is reversed in response to a signal sent thereto on the conductor 57 by the detector means 21, 22 when the beam therebetween is broken by the bundle of banknotes passing to the opening 14.

This reversing of the motor 52 is continued until the beam from lamp 21 again impinges on the photo cell 22, i.e. until the banknotes are removed from the opening 14, thereby preventing the table 12 from being lifted towards said opening until the opening is clear. Subsequent to having rotated the requisite number of revolutions, to return the table 12 to the FIG. 1 position, a signal is sent from said motor to the circuit 46, indicating that the table is in position for a further bundling operation. When the opening is clear, the reversing signal to the motor 52 ceases, allowing the motor to be activated by an appropriate signal from the circuit 46 in respect of the next transaction in line.

If, for some reason or other, more than one banknote at a time is dispensed through the rollers 10, this will be detected by the sensors 55 and an error signal having said second value of, e.g., 5 volts is sent to the error and counting circuit 46 through the conductor 56. The counter continues to count down to zero, and when having counted down to zero an error signal is sent to the motor 52 which, in response thereto, rotates the pulley 43 clockwise through a given small angle, so as to force the outer end of the table 12 against the stop 16 and to cause said table to be swung down to the position shown in ghost lines and the banknotes resting on said table to slide or fall down into a suitable receptacle. The motor 52 is suitably programmed so that the pivoting force is only applied to the table means for a relatively short period of time, again some few milliseconds, whereafter the motor stops and the table is returned to its FIG. 1 position by means of the counter weight 53. As the motor 52 stops, a signal indicating that the error procedure has been completed is sent from the motor to the circuit 46, which in response thereto reintroduces the transaction into the counter of said circuit and repeats said transaction.

As will be understood from the aforegoing, the apparatus is so constructed that no banknotes can be dispensed by the pick-up rollers 10 to the table 12 until the table has returned to the FIG. 1 position. Neither can the table be lifted towards the third conveying means until the opening 14 is clear, although banknotes may still be dispensed to said table from the first conveying means even though the opening 14 is blocked by banknotes from a preceeding transaction.

The speed at which the apparatus operates and its reliability in operation enables it to service two customers or two bank clerks at the same time and through the same

receipt opening 14. However, in order to distinguish between orders and in order to ensure the correct customer or client is serviced, the receipt opening 14 is provided with a shielding device 65 which automatically covers one side of the opening 14 whilst leaving the other side free. The device 65 is pivotally arranged on a horizontal shaft 66, such as to provide free access to the receipt opening from one side thereof (e.g. from the right) and to prevent removal from the receipt opening from the other side thereof (from the left).

The device 65 is arranged to take one of two possible positions, namely the position 67 shown in full lines or the position 67' shown in ghost lines, depending from which side (left or right) a bundle of notes is to be taken in response to an order. The device 65 is brought automatically to its correct position (position 67 or position 67') by means not shown, when said vertical upward movement of said conveying means 12 is initiated.

The apparatus is suitably constructed in a manner such that if a customer should forget to remove the banknotes which he has ordered and which are thus available in the receipt opening 14, the device 18 and the conveying means 12 are caused to adopt positions 18' and 12' respectively, as shown in FIG. 2, and the third conveying means is caused to move in a direction opposite to the normal movement, whereby the bundle of notes is returned to the conveying means 12 and then conveyed by said means 12 to a position shown in FIG. 1, and then further to the space 17 (the conveying means 12 takes the position 12'). In this way an unauthorized person (the next customer) is prevented from removing said bundle of notes and the forgetful customer can recover his property upon reporting the matter.

Claims

1. An apparatus for feeding a given number of sheet-like elements from a store of such elements to a receipt opening, comprising: an element-dispensing control means; first, second and third element-conveying means having respective drive means electrically connected to said control means for controlling the respective operating sequences of said drive means, said second conveying means being movable towards and away from said third conveying means; and counter means for counting the number of elements dispensed from said store in response to an ordered number of said elements, wherein the drive means of the first conveying means is arranged, in cooperation with said control means, to dispense a given number of sheet-like elements to the second conveying means in dependence upon

the absence of a previously dispensed bundle of elements on the second conveying means but independent of the presence or absence of a previous conveyed bundle of elements in the receipt opening; and wherein the drive means of the second conveying means is arranged, in cooperation with said control means, to transfer the elements to said third conveying means in dependence upon the absence of a previously further conveyed bundle of elements in the receipt opening, whereby feeding of said sheet-like elements from said store to said second conveying means can commence during that time in which a previously conveyed bundle of said elements still remains in the receipt opening, thereby enabling the dispensing procedure to be considerably expedited.

2. An apparatus according to claim 1, wherein the second conveying means comprises a lifting device for lifting a dispensed given number of banknotes vertically upwards to the third conveying means.

3. An apparatus according to claim 1 or 2, characterized by a sleeve located adjacent the upper part of the receipt opening and being pivotally arranged on a horizontal shaft, said sleeve being arranged to provide free access to the receipt opening from one side thereof and to prevent removal from the receipt opening from the other side thereof, and also arranged, in conjunction with the function of the second conveying means to take any one of two possible positions in dependence upon from which side a bundle of elements shall be taken in response to an order for the dispensement of said bundle.

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U.S. Patent Documents

3965913	June 29, 1976	Tokura et al.
4017004	April 12, 1977	Onoe et al.

Patent History

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Application Number: 6/137,189

Classifications

Current U.S. Class: **133/1R;** 133/8R; 194/DIG26; Feeler Control (271/31); With Circumferential Pocket Members (271/315)
International Classification: B65H 344;

JUSTIA

Method for a banknote detector device, and a banknote detector device

Apr 20, 2010 - Banqit AB

A banknote detector device for an automatic teller machine, for differentiating between non-accepted and accepted banknotes, includes a banknote image sensor to receive and scan at least one face of an input banknote and to store a banknote image (BI) of each scanned. The image includes image data in the form of a number of

pixels; and a reference banknote image (RBI) storage where one reference banknote image, being processed from a predetermined number of banknote images from accepted banknotes, is stored for each face of each banknote. The device includes an alignment, a banknote face classification unit, a printed pattern positioning unit and a comparison unit where, for at least one face of the banknote, the BI and RBI, being in exact pattern position in relation to each other, are compared pixel per pixel according to a predefined comparison procedure to classify the banknote as accepted or non-accepted.

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- METHOD FOR A BANKNOTE DETECTOR DEVICE, AND A BANKNOTE DETECTOR DEVICE

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Description

FIELD OF THE INVENTION

The present invention relates to a method and a device according to the preambles of the independent claims.

The present invention is pertinent as to arts and devices for checking and determining authenticity, value and unfitness (decay) degree of banknotes, and in particular to banknote handling machines, or automatic teller machines (ATMs), to search for and to find counterfeit banknote or banknotes being ink dyed as a result of non-authorized opening of a cassette provided with an ink dyeing ampoule.

BACKGROUND OF THE INVENTION

In spite of numerous predictions of a cashless society, the amount of cash in circulation has not declined. There are today an estimated 360 billion transactions in the EU every year to be compared with 60 billion non-cash transactions. The handling of cash is a very cost consuming operation still involving a lot of manual handling and transportation to and from consumers, retailers, banks, cash centres and National banks. The cash is counted on numerous occasions during this circulation and the security problems are extensive. The annual cost for handling of cash in the European Union is around 50 billion Euro.

Conventional banknote sorting and counting devices are designed for automatic processing of banknotes of any issue, value and country. The process on which the operation of the device is based consists of determining authenticity, denomination and decay level of a banknote using full images—obtained with scanning devices—of both banknote sides inter alia in the visible spectral range and in the infrared spectral range. The images are transmitted to and processed in a computing unit where obtained images are compared to reference images with the help of preinstalled pattern recognition software.

A number of different measures have been taken in order to secure banknotes against counterfeits, e.g. by printing pictures on banknotes with so-called metameric inks; these pictures cannot be seen with a naked eye and only reveal themselves in the infrared spectrum. Knowing a concrete infrared image, it is possible to develop a detector that checks several certain points on the banknote surface for availability or absence of metameric ink.

EP-1160737 relates to a method for determining the authenticity, the value and the decay level of banknotes, and a sorting and counting device.

WO-95/24691 relates to a method and apparatus for discriminating and counting documents that inter alia comprises a memory that stores master characteristic

patterns corresponding to associated predetermined surfaces of a plurality of denomination s of genuine bills.

GB-2199173 relates to a bill discriminating device adapted to carry out an operation by extracting data from only a characteristic region of a bill.

The inventors to the present invention have identified a need of improved detection capabilities regarding banknotes being ink dyed as a result of robbery.

SUMMARY OF THE INVENTION

The above-mentioned object is achieved by the present invention according to the independent claims.

Preferred embodiments are set forth in the dependent claims.

Thus, according to the present invention a method and a device are arranged in order to improve the capabilities of detecting ink-dyed banknotes.

In Short the Method Comprises:

- A) an alignment step where one side of the banknote image is aligned, by use of a stored IR-image of the input banknote, in relation to the respective side of a reference banknote image (RBI), and that the banknote size is determined,
- B) a banknote face classification step is performed to determine face and orientation of the banknote image,
- C) a printed pattern positioning step where the printed pattern of the banknote image (BI) is determined in order to exactly position the BI printed pattern in relation to the printed pattern of a reference banknote image (RBI),
- D) a comparison step where, for at least one face of the banknote, the BI and RBI, being in exact pattern position in relation to each other, are compared pixel per pixel according to a predefined comparison procedure resulting in that the input banknote is classified as accepted or non-accepted.

The present invention will now be described in detail with references to the appended drawings

SHORT DESCRIPTION OF THE APPENDED DRAWINGS

FIG. 1 is a flow diagram illustrating the present invention.

FIG. 2 is a block diagram illustrating an embodiment of the present invention.

FIG. 3 is another flow diagram illustrating the present invention.

FIG. 4 shows a raw image of a robbery ink coloured banknote, before any processing is made on the image.

FIG. 5 is an IR-image of the banknote prior the skewing procedure.

FIG. 6 shows an IR-image of the banknote inbound in a rectangle determined in the skewing procedure.

FIG. 7 shows four different images of one banknote, the front side, back side (upper row) and each side rotated 180 degrees (lower row).

FIG. 8 illustrates the step of locating the pattern position.

FIG. 9 shows a zoomed in detail of a matched pattern position during the matching step.

FIG. 10 illustrates a reference image created by calculating the mean-value of the pixels of each pixel position from typically 200 street quality banknotes.

FIG. 11 shows a street quality processed reference banknote image.

FIG. 12 shows masked out and not detected region of a banknote.

FIG. 13 illustrates an image pixel grid.

FIG. 14 is a non-grey colours diagram, although shown in a grey-scale where cyan, yellow and magenta are indicated.

FIG. 15 is a dirt-colours diagram.

FIG. 16 is a high-gain colours diagram.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

The banknote detector device according to the present invention may be arranged as a separate module of a standard ATM, or may be implemented as an integral part, using the available image detectors, of a standard ATM. As indicated above the

banknote detector according to the present invention is suited, in particular, to detect, identity and sort-out ink-dyed banknotes. The banknote detector device may be used in conjunction with other detector devices that are specifically dedicated for detection of false banknotes. It should be noted that the detector device according to the present invention, if being properly set-up, also may be used in that regard.

With references to FIG. 2 the detection is performed by a banknote image sensor, that preferably comprises two physical detector-units, one detector for each side of the banknote. If any of the detectors detect a dyed face, the note is considered as dyed. The banknote handling device comprises the banknote image sensor, preferably an infrared (IR) image sensor and an image processor. The image processor includes, in its turn, a storage, a reference banknote image (RBI) storage, an alignment unit, a banknote face classification unit, a positioning unit, and a comparison unit. The IR-image of the banknote is stored in the storage such that the IR-image being linked to the corresponding banknote image. As will be discussed below the IR image sensor may be obviated. Also the banknote alignment and banknote classification may be performed by other means, but these units are nevertheless included in FIG. 2 as the results of the corresponding method steps are necessary requirements for the steps C and D, as will become clear from the following description.

The image processor receives, from the detectors, image signals representing the detected images, and the image processor then processes the image signals.

A banknote image comprises one infrared (IR)-layer and layers for each RBG (Red, Blue, Green) colour, i.e. totals 4 layers. The IR-layer resolution is preferably 864×300 pixels, while each RGB layers are squared symmetric pixels with a resolution of 432×300 pixels. However, the IR-layer is addressed and effectively used only by squared symmetric 432×300 pixels in order to simplify the algorithm. Each symmetric pixel represents 0.5×0.5 mm. All pixels have a value 0-255 where 0 is the darkest. When processing the banknote image according to the algorithm the colour image layers are read and counted as inverted CMY (Cyan, Magenta, Yellow) where 255 is the darkest. CMY is used to define logical values of the amount of colour-print on white paper. It should be noted that the present invention is equally applicable if RBG is used instead for processing purposes.

The RGB-image of the banknote is preferably obtained by a Colour Contact Image Sensor, a CIS-sensor.

According to one embodiment the banknote is at a distance of max 1 mm from the CIS-sensor in order to be able to pull the banknote pass the sensors.

In another embodiment the banknote is mechanically moved passed the CIS-sensor and pressed towards the sensor. More accurate measurements are then obtained and e.g. the IR-sensor may be obviated.

The illustration in FIG. 4 shows a raw image of the front side of a robbery ink coloured banknote, before any processing is made on the image. In this case a Swedish **100** crown banknote.

The method according to the present invention, comprising steps A, B, C and D, will now be described with references to the FIGS. 1, **3** and **4-15**.

A—Alignment Step

The purpose of this step is to align the scanned banknote in order to determine the size of the banknote. This is preferably performed by a so-called “squeezing method” which is schematically illustrated in FIG. 5 that shows an IR-image of a non-aligned banknote. In the aligning step the IR banknote image, being a dark rectangle, preferably is used. According to an alternative embodiment the alignment instead is performed using the banknote image obtained by the banknote image sensor.

The angle between the dark rectangle, the banknote image, and a horizontal line is determined, and the banknote image is then iteratively rotated until the banknote image is in a horizontal position, i.e. the longer side is horizontal. It should be noted that any side of the banknote could be used in when performing the alignment. The orientation of this side is then compared to the orientation of the respective side of the reference banknote image. During the iteration the first rotation of the banknote image is rather big, the next rotation is e.g. half the first rotation, etc.

It should be noted that the aligning step is preformed on all detected banknotes.

This step of the procedure is to orientate, or align, the banknote image in a predefined position, e.g. horizontally, which is a presumption when performing the subsequent steps.

According to this step, the angle of a rectangular or approximated rectangular banknote image document is determined by identifying the skew-angle where the

document vertical height is minimum.

Thus, for this purpose the IR-image is used. The quality of the IR-image must be such that it does not indicate any dark pixels outside the document. A threshold is used to indicate dark pixels. During the alignment step different skew-angles are tried out and the height is measured until the angle resulting in the minimum height is found.

For practical reasons related to the used programming technique the image-data is never moved when the angle-skew is performed, but instead the read-process does perform an angle-skew x-y-coordinate recounting according to a preset angle. Referring to FIG. 5, showing an IR-image of the banknote prior the skewing procedure, the height is measured in this clockwise skew as y1p-y0n. An approximated correction angle is calculated by use of all four points y0n, y0p, y1n, y1p. After correction of the angle the process is repeated using the new correction.

When the difference ((y1p-y0n)−(y1n-y0p)) are small, called “level-I” (i.e. the angle is small) the correction is only ½ of the approximated calculated value. When even smaller difference, called “level-II”, the correction is only ¼ of approximated calculated value. This is to ensure that the best fit angle is not missed. The last level-II is repeated until no more changes in height can be determined.

When the skew instead is counter clockwise, the same, but mirrored, calculation is performed.

When the angle determination is ready, the corners position in the image are determined as the smallest rectangle where all the document's IR-pixels can be inbound. This is illustrated in FIG. 6 that shows the IR-image of the banknote inbound in a rectangle determined by the skewing procedure.

The corner positions are stored in the storage arranged in connection with the image processor together with the skew-angle.

After this process the document's pixels are read as in FIG. 6 by processing the skew-angle and document position left-top as x-y-coordinate 0,0.

According to an alternative embodiment the position and the size of BI is determined by instead identifying the position of the banknote corners and the angle to a horizontal line and by trigonometrical calculations determine the size and position. This may be performed on either the BI or the IR-image.

B—Banknote Face Classification Step.

A presumption for this step is that the size of the banknote image has been determined (in aligning step A), and a purpose of this step is to identify the scanned banknote and to identify orientation and side. Below is one embodiment discussed in detail but many other alternatives exist, as this information may already be available from other sensors of the system, i.e. from other sensors arranged to verify the authenticity to the input banknote. However, this step must be performed prior the remaining steps C and D.

Based upon the size, stored denomination data related to this size is identified. For example: one specific size has four different denomination data stored; front side (correctly oriented and up and down) and back side (correctly oriented and up and down). In some cases even a higher number of different denomination data might be stored. E.g. if different versions of a banknote have been issued.

For each stored denomination data certain fields are identified, being carefully chosen to represent a unique set of identification parts of the banknote. These fields may be part of the banknote that should be white (or light coloured). The number of fields chosen depends upon the outlook of the banknote, e.g. a very coloured banknote requires more fields. Also the geometric shape of a specific field is chosen in relation to the outlook of the banknote and could be rectangular, circular or any suitable shape.

In the case where four denomination data are used the respective data field are all compared to the detected banknote image and the denomination of the detected banknote is then identified being the banknote where the fields corresponds to the fields of one of the stored denomination data. As a result the denomination and which side and orientation of the banknote that the detected banknote image relates to is identified.

More in detail, this step is performed by using a predetermined number of sample regions that together are unique for a banknote of a determined size. The classification is performed by a banknote face classification unit by calculating at least one value related to the pixel values of each sample region of the aligned banknote image and comparing the at least one pixel values to specified values representing a specific banknote face to determine face and orientation of the banknote image.

In this step it is determined which face (side) of the banknote the image represents, and also the orientation of the banknote.

FIG. 7 shows four different images of one banknote, the front side, back side (upper row) and each side rotated 180 degrees (lower row).

The banknote image document is classified as a recognized size and recognized face-image, or it may be considered as unclassified.

The face of the banknote is recognized by using small rectangle sample regions, or any other shape, e.g. circular, that together are unique for the face of the determined size. Each specific banknote is represented by four different images where each has its face sample regions. This is illustrated in FIG. 7 and the four different images is the front side, back side and each side rotated 180 degrees.

The regions are identified by the number of dark pixels in the region. Any combination of the layers (CMY) and any threshold-level may be adapted individually for each region.

Thus, the result is a numerical value of face-identification and information if face is upside down. Unclassified face results in that the banknote is classified as a dyed banknote. The information regarding the identified face of the detected banknote is necessary in the following steps as the corresponding face of the reference banknote image (RBI) is to be used.

C—Printed Pattern Positioning Step

The printed pattern on a banknote is located at individual predetermined positions for individual banknotes due to slight differences related to production tolerances. The pattern position must therefore be accurately determined for the banknote to be able to perform accurate comparisons to the reference banknote image.

It is therefore extremely important that the detected image is positioned in a known position before the comparison step is performed.

FIG. 8 illustrates the step of locating the pattern position.

To perform this, two predefined limited regions are identified, one horizontal region X and one vertical region Y which are shown in FIG. 8.

With references to region X in FIG. 8 the limited region is scanned to create a line-pattern (strip or line S in the illustration). The line-pattern is created by calculating the mean value of all pixels in one vertical row in the region and then aligning all mean values. The result is a small data-area that represents the whole defined region. Only one predefined layer of CMY is selected individually for each face/scanning (but in the figure it is shown as monochrome grey).

The scanned line-pattern S is compared to a reference line-pattern R. By trying to match R and S in a number of different positions, by comparing the sums of all pixels difference abs(R-S) in the line, a best match adjusted position offset is the result. Objects that are not position-related to the pattern, such as metallic strips, are masked out and not included in the comparison. The adjusted position is illustrated as the line R and is moved to an adjusted position line A. The reference line-pattern R is typically created from mean-values from 800 scanned images that are pattern-matched.

FIG. 9 illustrates a zoomed detail of the adjusted strips, i.e. of a matched pattern position during the matching step. Here the different strips are denoted R_x, A_x and S_x.

Preferably the reference-line R is moved to an adjusted position line A, that achieves good matching to the scanned line-image S. However, the important feature is how much the scanned line-image S has to be moved in relation to the reference-line R in order to achieve a good matching, irrespectively if line R or line S is moved.

This process for horizontal pattern X-match is repeated for vertical pattern Y-match. The x and y offsets are saved for later reference during the pattern-comparison step.

It should be noted that by this positioning step the picture (pattern) on a banknote is correctly positioned in relation to the pattern of the reference image which is necessary in order to obtain very accurate results in the next step.

By instead using e.g. the corners of the banknote in order to correctly position the banknote would not result in that the banknote is enough accurately positioned to ascertain highest possible detection yield in the next step, e.g. the picture on banknotes is often not positioned in exactly the same place on the paper and that the size, and then the position of the corners, might deviate up to one or two millimetres between different banknotes.

Preprocessing of a Reference Banknote Image (RBI).

A reference image of each face of a banknote must be created in order to perform the comparison step with the banknote to be investigated.

This process to create reference images are made only once prior when the banknote detector device is set up for use. Thus, before an entire banknote can be scanned for robbery ink colour, a reference image for each face must be available to know where printed colour already exist as normal pattern of a banknote, and how normal existing dirt appear.

FIG. 10 illustrates a reference image created by calculating the mean-value of the pixels of each pixel position from typically 200 street quality banknotes.

According to a preferred embodiment typically 200 banknotes are scanned in a detector machine, e.g. a CIS-sensor. The number must be at least 100, and if possible as many as 400. To avoid repeatable inaccuracy such as individual detector-specific inaccuracy, images are sampled from two different detectors in the machine, and from different scanned faces-directions. The banknotes should be of street quality including normal existing dirt etc.

The scanned image is stored in an RBI storage as an RGB image. In order to facilitate the further processing of the image, the image is preferably “inversed” and stored as a CMY image (Cyan, Magenta, Yellow).

All 800 images for one banknote (front side, backside, and each side rotated 180 degrees) are then matched together by the pattern. To perform the pattern-match, the printed pattern positioning step (C) described above is used, but since the final reference line-pattern is based on this mean-image, a temporary reference line-pattern created from one single good quality note is used in the first iterate. After the pattern-matching, the reference image is created by calculating the mean-value of the pixels of each pixel position.

In an iterate method to increase reference image quality, this first created reference image is now used to create a new better reference line-pattern to be used in the step C. This process to create a reference image mean-value from the 800 images is then repeated, but instead of using the single good quality note, the improved mean-value reference line-pattern data is used.

The iterated reference image is cropped (outer line in FIG. 11) by estimating the end where a few individual notes paper no longer exist (i.e. where pattern and dirt start

get lighter). The result should be a reference-size of a minimum paper-size rather than a mean-size.

The result is only for the reference line-pattern purpose, the entire mean-image is not used and may only be saved to re-create a modified reference line-pattern with a new defined region.

FIG. 11 shows a street quality processed reference banknote image.

After the final reference line-pattern is ready, a reference banknote image is created for colour detection purpose.

The reference image for detection purposes should accept individual typical darker detected banknotes, due to individual banknote production pattern-darkness or individual dirt etc. In addition the reference image for detection purpose should accept smaller individual mismatch of located position for detected notes.

All 800 images are used again, and after matched by locating the pattern position, each CMY-layer pixels are separately calculated by mean value plus one standard-deviation for each of the 800 images. This will make the reference image darker.

Furthermore, starting by the resulting reference image each pixel are moved to the 8 closest adjacent positions to create total 9 identical images but with 9 different positions. The CMY-layers of the 9 images are separately merged by choosing the darkest pixel. This will make the reference image less sensible to mismatched detected banknotes.

The result that consist of a reference line-pattern and a processed reference images for each face are merged together with the detection-application in the target system. This processed reference banknote image is denoted RBI and is stored in the RBI storage and illustrated in FIG. 11.

D—Comparison Step

Now, going back to the processing of a banknote inserted into a banknote handling machine.

After that the location of the pattern position is determined according to step C, the banknote image is divided into different defined detection zones to be differently processed by the colour detection algorithms.

FIG. 12 shows masked out and not detected region of a banknote. Predefined non-detectable zones are regions that may include objects that are not position-related to the pattern, such as metallic strips. They are masked out and not detected.

All the region that match inside the reference image is detected by reference-detection. Regions outside the reference image is detected by a non-reference-detection if the region is white which is marked by magenta (see arrows **3)** in FIG. 12, while if the region outside the reference is a pattern-region then it is non-detectable and just masked out (see illustration where a magenta-zone is cut).

Each pixels in the image that are detectable is iterated for detection and is denoted a dyed-value. The dyed-value is higher on clearly ink-coloured spots while a more doubtable ink-coloured spot results in a lower dyed-value. If the sum-value of all pixels' dyed-values exceeds a predefined level this results in that the banknote is classified as a dyed banknote.

FIG. 13 illustrates an image pixel grid where dp denotes a detected pixel and ap denotes ambient pixels.

Since a large amount of individual single pixels with positive ink-detection due to e.g. optical interference exist, the detection is set up such that a single pixel never will result in a dyed-value. According to one embodiment only the detected pixel dp together with the 4 closest ambient pixels may be detected as a dyed spot. The detected pixel is detected by a detection colour-algorithm, while the ambient pixels condition must only match the detected pixel in CMY colour levels to create a dyed spot, i.e. to qualify the detected pixel. A smaller or larger number of ambient pixels may be used in this step as the chosen number depends inter alia upon the required accuracy and available processing capacity. For example 8 or 12 ambient pixels could be used in this regard.

The colour-classification of the pixels will be discussed in the following. Each detect pixel colours are classified for detection purpose. In FIGS. 14-16 a number of colour CMY diagrams are shown—only shown in a grey-scale. Colour diagrams show only the pure colour composite, while the grey-scale, down to black, are not shown in the diagrams but is included in the classification.

FIG. 14 is a non-grey colour diagram, although shown in a grey-scale, where cyan, yellow and magenta are indicated.

The class “grey-colour” is the central part of the non-grey diagram, included all the grey-scale from white to black. The purpose for this is that detection should be less sensible to grey colours since the captured image creates a lot of grey-scale shadows and grey-scale sensible-defects.

FIG. 15 is a dirt-colours diagram.

The class “dirt-colour” is rare existing robbery ink colours, while this spectra is (except grey) the most common for dirt. This class is less sensible to colour detection.

FIG. 16 is a high-gain colours diagram Class “high-gain colour” is specific monochrome existing robbery ink colours that also typically is low-level colour. These specific colours, cyan and magenta, are therefore treated by using an extra sensible detection.

A colour detection algorithm will be described in the following.

For all iterated detection pixels, a CMY value must exceed a threshold level, where the threshold level is typically determined by the reference banknote image (RBI). Then the detection pixel must agree with the ambient pixels' colours, and then a dyed-value is determined for the detected pixel.

More in detail this is performed as described in the following:

Each detect-pixel position is iterated. For reference-detection CMY threshold levels are found by reading out the CMY-values from the reference image position, while for a non-reference-detection the threshold levels are fixed. The detect pixel CMY-value is read out.

If the detected pixel colour is a predefined “high-gain colour” and all CMY threshold-levels are less than 80 (i.e. only light regions), then the threshold levels are lowered by half for extra sensibility.

The detect-pixel CMY-values are compared to the CMY threshold-levels. If all CMY values are under the threshold-levels, the detect-pixel is considered as a not dyed spot, else the detect-pixel colour is classified, i.e. given a dyed-value. If grey or dirt-colour class, the threshold-levels will be increased and the comparison is repeated with the higher threshold levels and detect-pixel may be a not dyed spot, else the detection continues by comparing the detected pixel with the ambient pixels. If any

of the ambient pixels have a level different than the detected pixel, the spot is considered as not dyed, else the detection continues by evaluating the dyed value.

The dyed value is counted by a progressive value due to how much the detected pixel CMY values exceed the threshold levels, only the highest exceeded value of CMY is the base to the dyed-value. At last if the detected pixel colour class is grey or dirt-colour, the dyed-value will be lowered or even may be disregarded as not dyed.

The result is summed for all iterated pixels into a total dyed-value for the entire banknote. The banknote is considered as dyed if the total dyed-value exceed a predefined level and a non-accepted signal is generated by the comparison unit, else an accepted signal is generated.

In summary, the comparison step comprises two different sub-steps, or subtests:

Threshold test—only applied if BI pixel is in the colour-scale “grey”.

Spot test—to be regarded as a spot not only one pixel is required, but preferably the detected pixel and four ambient pixels should have essentially the same colour.

A requirement to perform the spot test is that the detected pixel and four ambient pixels, see FIG. 13, have essentially the same colour, then a difference value for the detected pixel with regard to the corresponding pixel in the RBI is determined.

Different parts of the colour diagram have different related points. The colour of the detected difference pixels must be determined. If a detected difference is an accepted detected difference depends also where in the colour diagram the colour for the identified detected difference pixel is positioned.

If the pixel is in the green/red part a higher point is given the dyed-value.

If the pixel is in the grey or brown parts a relatively lower point is given the dyed-value.

In addition, if a large difference between RBI and BI pixel values are determined additional higher “points” may be awarded that pixel's dyed-value, e.g. according to a progressive scale.

An overview of the comparison step is described as follows:

- Step 1: If colours of dp and 4 ap:s are approximately the same then continue to next step, else go to next dp.
- Step 2: Compare colours of BI dp and the corresponding RBI pixel and determine a difference value, DV, representing the difference between these colours.
- Step 3: Determine the position in the colour diagram of BI dp and determine a colour value CV related to that position.
- Step 4: Compare DV to CV and if DV exceeds CV, add DV to the dyed value calculation related to the banknote.
- Step 5: If the total dyed value for the entire banknote exceeds a preset threshold value the banknote is classified as non-accepted, i.e. dyed.

As an example, the point awarding functions result in that few sharp red spots detected on the banknote result in an ink-dyed detection, and that many small red spots detected on the banknote also results in and gives an ink-dyed detection. This is due to the fact that the colour red is awarded high points in the colour diagram and that sharp colours, meaning higher detected difference, also is awarded a higher point.

A specific requirement for the banknote detector device is that all tests must be performed during a maximal time period of 100 ms.

The reason is that once the detection is performed, i.e. the banknote has passed the sensor, it continues along a feeding path to a junction where a non-accepted banknote is routed to a separate feeding path, and that the distance along the feeding path up to the junction must not be too long.

The present invention is not limited to the above-described preferred embodiments. Various alternatives, modifications and equivalents may be used. Therefore, the above embodiments should not be taken as limiting the scope of the invention, which is defined by the appending claims.

Claims

1. Method in a banknote detector device for an automatic teller machine, to be used to differentiate non-accepted banknotes from accepted banknotes, the device comprises a banknote image sensor to receive and scan at least one face of an input banknote and to store a banknote image (BI) of each scanned face in a storage in dependence of said scanning, said banknote image comprises image data in the

form of a number of pixels; and a reference banknote image (RBI) storage where one reference banknote image (RBI), being processed from a predetermined number of banknote images from accepted street-quality banknotes, is stored for each face of each relevant banknote, the banknote detector device further comprises an IR image sensor that is arranged to scan an input banknote and to store an IR-image of said banknote in said storage such that the IR-image being linked to the corresponding banknote image, wherein said method comprises:

A) an alignment step where one side of the banknote image is aligned in relation to the respective side of the RBI by use of said IR-image, and that the banknote size is determined,

B) a banknote face classification step where the face and orientation of the banknote image are determined,

C) a printed pattern positioning step where the printed pattern of the banknote image (BI) is determined in order to exactly position the BI printed pattern in relation to the printed pattern of a reference banknote image (RBI),

D) a comparison step where, for at least one face of the banknote, the BI and RBI, being in exact pattern position in relation to each other, are compared pixel per pixel according to a predefined comparison procedure resulting in that the input banknote is classified as accepted or non-accepted,

wherein in step C, two predefined limited regions of the BI are identified, one horizontal region X having a preset width and running along the longer side of the banknote and one vertical region Y having a preset width and running along the shorter side of the banknote, a line-pattern is created by calculating the mean values of all pixels in one vertical row in the horizontal region X and then aligning all mean values, resulting in a horizontal data-area line Sx representing the whole region X, and the same procedure is performed for the vertical region Y resulting in a vertical data-area line Sy representing the whole region Y, wherein Sx and Sy are compared to line-patterns of the RBI obtained in the same way and that said line-patterns are adjusted in relation to each other such that differences between corresponding pixel positions are minimized and the BI and RBI are then adjusted accordingly in relation to each other.

2. Method according to claim 1, wherein in step A, a squeezing method is used where the angle between the dark rectangle of the IR-image and a horizontal line is determined, and the banknote image is then iteratively rotated until the banknote image is in a horizontal position, where the longer side is horizontal.

3. Method according to claim 1, wherein in step D, predefined metal strips and serial numbers parts of the banknote are not taken into account.

4. Method according to claim 1, wherein in said reference banknote image (RBI) storage one reference banknote image (RBI) is stored for each face of each relevant banknote such that each specific banknote is represented by four different images, one image per banknote side and each side rotated 180 degrees.

5. Method according to claim 1, wherein said RBI is obtained by processing, according to an RBI processing algorithm, in an image processor, a predetermined number of banknote images from accepted street-quality banknotes, wherein each pixel in the reference banknote image are moved to the 8 closest adjacent positions to create in total 9 identical images but with 9 different positions.

6. Method according to claim 1, wherein in step D a detected pixel is denoted a dyed-value as a result of comparison to a corresponding RBI pixel provided that a preset number of, preferably four, ambient pixels have essentially the same colour.

7. Method according to claim 1, wherein in step D a difference value is determined for the detected pixel with regard to the corresponding pixel in the RBI and the difference value is compared to a colour value related to the position of the BI detected pixel in a colour diagram, and if said difference value exceeds the colour value a dyed value for the banknote is increased by the difference value.

8. Method according to claim 1, wherein in step D, some predefined parts of the banknote are not taken into account.

9. Banknote detector device for an automatic teller machine, to be used to differentiate non-accepted banknotes from accepted banknotes, the device comprises a banknote image sensor to receive and scan at least one face of an input banknote and to store a banknote image (BI) of each scanned face in a storage in dependence of said scanning, said banknote image comprises image data in the form of a number of pixels; a reference banknote image (RBI) storage where one reference banknote image (RBI), being processed from a predetermined number of

banknote images from accepted street-quality banknotes, is stored for each face of each relevant banknote, and

an IR image sensor arranged to scan an input banknote and to store an IR-image of said banknote in said storage such that the IR-image being linked to the corresponding banknote image,

wherein said detector device comprises

an alignment unit to align one side of the banknote image in relation to the respective side of the RBI by using said IR-image, and that the banknote size is determined,

a banknote face classification unit to determine face and orientation of the banknote image,

a printed pattern positioning unit where the printed pattern of the banknote image (BI) is determined in order to exactly position the BI printed pattern in relation to the printed pattern of a reference banknote image (RBI),

a comparison unit where, for at least one face of the banknote, the BI and RBI, being in exact pattern position in relation to each other, are compared pixel per pixel according to a predefined comparison procedure resulting in that the input banknote is classified as accepted or non-accepted,

wherein in said pattern positioning unit two predefined limited regions of the BI are identified, one horizontal region X having a preset width and running along the longer side of the banknote and one vertical region Y having a preset width and running along the shorter side of the banknote, a line-pattern is created by calculating the mean values of all pixels in one vertical row in the horizontal region X and then aligning all mean values, resulting in a horizontal data-area line Sx representing the whole region X, and the same procedure is performed for the vertical region Y resulting in a vertical data-area line Sy representing the whole region Y, wherein Sx and Sy are compared to respective line-patterns of the RBI obtained in the same way and that said line-patterns are adjusted in relation to each other such that differences between corresponding pixel positions are minimized and the BI and RBI are then adjusted accordingly in relation to each other.

10. Banknote detector device according to claim 9, wherein said alignment unit uses a squeezing method where the angle between the dark rectangle of the IR-image and a horizontal line is determined, and the banknote image is then iteratively rotated until the banknote image is in a horizontal position, where the longer side is horizontal.

11. Banknote detector device according to claim 9, wherein said banknote image sensor is a banknote RBG image sensor, and that the images are stored in CYM format.

12. Banknote detector device according to claim 9, wherein in said reference banknote image (RBI) storage one reference banknote image (RBI) is stored for each face of each relevant banknote such that each specific banknote is represented by four different images, one image per banknote face and each face rotated 180 degrees, said RBI is obtained by processing, according to an RBI processing algorithm, in an image processor.

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Patent History

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Classifications

Current U.S. Class: **Reading Paper Currency (382/135);** 3-d Or Stereo Imaging Analysis (382/154); Image Segmentation (382/173); Pattern Recognition (382/181)
International Classification: G06K 9/00 (20060101); G06K 9/34 (20060101); G07D 7/16 (20060101); G07D 7/20 (20060101);

JUSTIA

Stacking and dispensing module

Jan 22, 2016 - NCR Corporation

A stacking and dispensing module (2) for use in an automatic teller machine (4), the module is configured to be arranged in connection with a banknote storage unit (6) comprising a banknote tray (8) on which banknotes (10) are stacked, the stacking and dispensing module (2) is configured to be in a banknote stacking mode, when banknotes are stacked in said storage unit (6), and

in a banknote dispensing mode, when banknotes are dispensed from said storage unit (6). A stacking wheel member (12) is active both during the banknote stacking mode and during the banknote dispensing mode, and that the rotation of the stacking wheel member (12) is configured to be controlled by a first direct current (DC) motor (20), and the rotation of a dispensing wheel member (16) is configured to be controlled by a second DC motor (22). The module further comprises: —a current measuring unit (24) configured to measure the currents applied to drive said first and second DC motors (20, 22) and to generate current signals (26, 28) in dependence thereto, —a control unit (30) configured to receive said current signals (26, 28), wherein the control unit (30) is configured to evaluate said current signals (26, 28) and to determine control signals (32, 34) for various functions of said module in dependence of said evaluation, and to apply said control signals for controlling said functions.

Latest NCR Corporation Patents:

- Audio request interaction system
- Transaction terminal with vertical weigh scale and methods of operation
- Edge system health monitoring and auditing
- Escrow clutch protection
- Methods and systems for routing transactions between automated teller machines, points of sale, financial institutions, and software wallets

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Description

This application is a national phase of International Application No. PCT/SE2016/050037 filed Jan. 22, 2016 and published in the English language, which claims priority to Swedish Patent Application No. 1550071-3 filed Jan. 23, 2015, which are hereby incorporated herein by reference.

TECHNICAL FIELD

The present disclosure relates to an automatic teller machine (ATM) for cash deposits and/or withdrawals. In particular the present disclosure relates to a stacking and dispensing module to be arranged in connection with each of a plurality of banknote storage units, e.g. cassettes, arranged within an ATM. The present disclosure also relates to an ATM provided with an advanced upper unit having the capability of reducing user intervention when depositing banknotes.

BACKGROUND

In spite of numerous predictions of a cashless society, the amount of cash in circulation has not declined. There are today an estimated 360 billion transactions in the EU every year to be compared with 60 billion non-cash transactions. The handling of cash is a very cost consuming operation still involving a lot of manual handling and transportation to and from consumers, retailers, banks, cash centres and National banks. The cash is counted on numerous occasions during this circulation and the security problems are extensive. The annual cost for handling of cash in the European Union is around 50 billion Euros. Significant savings could be made if a more rationalized and decentralized system could be introduced. The common currency makes it possible to take significant steps towards a more

efficient handling of cash within the European Union with potential cost savings amounting to billions of Euro.

One concept that provides a very cost efficient solution to the handling of banknotes is embodied by a local cash handling system, the so-called Q-CashRouter® concept, which is provided by the applicant to the present application. The Q-CashRouter® system is herein generally referred to as a local cash handling system. It is an innovative self-service unit for efficient recycling of banknotes. It allows retailers to deposit their daily takings in full parallel with private consumers withdrawing cash. Banknotes are recycled locally in the machine, which minimizes the need for expensive cash transports and costly control processing of deposited banknotes. The concept is ideal for locations like shopping malls with its high volume flow of notes between shops, banks and consumers.

The local cash handling system may be configured with e.g. three or even more consumer fascias. This allows e.g. a retailer to deposit bundles of unsorted notes, in full parallel with two private consumers making cash withdrawals. The multiple-fascia support radically improves the efficiency of cash recycling and eliminates the inconvenience for consumers to have to queue-up behind retailers making large volume deposits. During the same time as one retailer deposits a bundle of e.g. 250 notes, the local cash handling system can process up to twelve consumers withdrawing cash at the two side fascias.

Deposited notes are sorted, quality controlled, and checked for counterfeits. Only notes of good quality are recycled to customers by the local cash handling system. Excess good quality notes are sorted and bundled in single or multidenomination sealed packages, which can be used directly, e.g. for loading of ATMs and as small-change cash for retailers.

The local cash handling system may be installed in environments where large volumes of cash is processed every day, e.g. in supermarkets, in shopping malls and in larger bank branch offices. A supermarket could use the local cash handling system to build a private protected room. Cashiers deposit their daily takings in the local cash handling system and receive a receipt on the deposited amount. At the end of the day the deposited amounts are automatically reconciled with the amounts captured by the point of sale (POS) system. No manual counting or sorting of notes is required.

U.S. Pat. Nos. 6,581,746 and 6,945,378 relate to different aspects of the cash handling system described above. In addition it is referred to the following prior art documents also disclosing various aspects of cash handling systems: U.S. Pat. No. 5,000,322, US-2004/0056086, and U.S. Pat. No. 5,756,985.

These patents and patent application disclose in particular the storage and circulation of banknotes within the system required achieving the local cash handling, e.g. the handling of banknotes of different denominations being stored in different storage means to be available for withdrawals, and the handling of non-accepted banknotes being sorted out and stored separately in sealed transparent envelopes.

A conventional ATM is normally provided with removable banknote storage units, so-called cassettes, where deposited banknotes are stacked and stored, and where banknotes are dispensed from during withdrawal.

Dependent of the cash-flow and of type of ATM, empty cassettes are replaced by full cassettes if withdrawals exceed the deposits, and full cassettes are replaced by empty cassettes if deposits exceed the withdrawals. Each cassette must be docked into the ATM such that stacking of banknotes within the cassette is facilitated if the ATM is a dedicated deposit ATM, and if the ATM is dedicated for withdrawals it must have capabilities for dispensing the banknote from the cassette. And if the ATM is adapted for both deposits and withdrawals the cassette must be docked into the ATM such that both stacking and dispensing of banknotes in the cassette is facilitated.

An object of the present invention is to achieve an improved stacking and dispensing module to be used in connection with a banknote storage unit, e.g. a cassette, which module is robust, easy adaptable to various types of banknotes, has high capacity with regard to speed and essentially no, or very low, failure rate. An object is to achieve an improved ATM provided with an upper unit capable of improving the banknote depositing procedure.

SUMMARY

The above-mentioned object is achieved by the present invention according to the independent claim.

Preferred embodiments are set forth in the dependent claims.

The stacking and dispensing module according to the present invention is a compact module providing capabilities both for stacking of banknotes in a banknote storage unit, e.g. a cassette, and dispensing (feeding out) banknotes from the same unit. One stacking and dispensing module is intended to be arranged in connection with each banknote storage unit.

Features are provided to handle the high-speed stacking/feeding procedure keeping a very low failure rate. In addition, the construction of the recycling module results in a module being less complicated e.g. in that fewer sensors are required, has a considerably lower weight and power consumption, and thus being less expensive, in comparison to presently available modules.

Below some important features are listed:

- - The precise and intelligent control of the stepping and direct current (DC) motors.
  - The delicate control of the note lifting tray in the cassette ensuring exactly the correct pressure between the banknote and the feeding means.
  - Active stacking wheels during both stacking and dispensing.
  - The note-synchronized stacking wheel speed.
  - The pressure control of note bundle during stacking and dispensing.
  - Using the driving currents to the DC motors as measurement values for controlling various functions of the module.
  - Automatically adapt the module for dispensing banknotes of different thickness, quality, etc.

The features of particular interest are the features related to the above advantages, i.e. related to achieving the high-speed stacking/dispensing procedure; the low failure rate, the lower weight, and the low power consumption.

The current consumptions of the DC-motors used to drive various structural details of the module are measured.

More specifically, the driving current for each DC motor is measured. As the driving current is dependent of the output force (torque) from the DC-motor a quantitative measure of the function performed by the DC motor is available, from the measured current, which measure is used for determining control parameters for the stacking and dispensing module.

By applying this insight the inventors have realized that the stacking and feeding module may have a more robust and simplified structure in comparison to modules where instead numerous dedicated sensors as well as complex mechanics must be arranged to detect parameters required to perform the delicate control of a high-speed stacking and dispensing module.

By measuring the driving currents, information is gained which is used to control various functions of the module. Thereby the module is made simpler and more robust in that this collected information may be used such that some sensors conventionally used for control purposes may be excluded.

The stacking wheel has an essentially circular shape, and has a predetermined thickness and the outer edge has an outer circumferential contact surface. During specific parts of both the stacking and dispensing procedure the contact surfaces of the stacking wheels are in contact with an upper surface of a banknote on a banknote lifting tray of a cassette. The contact with the upper surface of the banknote serves two purposes, firstly it levels the banknote, and secondly to control the level of the tray. More specifically, the stacking wheel is configured to be rotated by a DC-motor and the driving current of the DC motor is measured and the measured current value is used to control the level of the tray in the cassette.

Thus, the stacking wheel is used both during the stacking procedure and the dispensing procedure to control the level of the tray of the cassette.

In one embodiment an advanced upper unit is provided capable of reducing user intervention when deposited banknotes are detected as non-accepted. This is achieved by arranging a drum storage unit for temporary storage of non-accepted banknotes, and then automatically feeding those non-accepted banknotes at least a second time through the detection unit, and turning the banknote upside down for each consecutive passage.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an image of an automatic teller machine (ATM) according to the present invention.

FIG. 2 is a simplified block diagram schematically illustrating the stacking and dispensing module according to the present invention.

FIG. 3 is a cross-sectional view schematically illustrating an ATM including stacking and dispensing modules according to the present invention.

FIG. 4 is a cross-sectional side view illustrating the stacking and dispensing module according to the present invention in a banknote dispensing mode.

FIG. 5 is a cross-sectional side view illustrating the stacking and dispensing module according to the present invention in a banknote stacking mode.

FIG. 6 is a front view illustrating the stacking and dispensing module according to the present invention.

FIG. 7 is a view from the opposite side compared to FIG. 6 illustrating the stacking and dispensing module according to the present invention.

FIGS. 8-14 illustrate various aspects of an embodiment of the present invention.

DETAILED DESCRIPTION

Throughout the figures the same, or similar, items will have the same reference signs. FIG. 1 is an image of an automatic teller machine (ATM) **4**, provided with a user interface **9**, according to the present invention. The illustrated ATM has one fascia which could be applied for deposits only, for withdrawals only, or for both deposits and withdrawals if local recycling of banknotes is implemented.

FIG. 2 is a simplified block diagram schematically illustrating the stacking and dispensing module **2** according to the present invention.

In the figure one stacking and dispensing module **2** for use in an ATM **4** is illustrated. The flow of banknotes to be stacked is indicated by an arrow **3**, and the flow of banknotes to be dispensed is indicated by an arrow **5**.

The module is configured to be arranged in connection with a banknote storage unit **6** comprising a banknote tray **8**, on which banknotes **10** are stacked.

A conventional ATM is normally provided with removable banknote storage units, so-called cassettes, where deposited banknotes are stacked and stored, and where banknotes are dispensed from during withdrawal.

Dependent of the cash-flow and of type of ATM, empty cassettes are replaced by full cassettes if withdrawals exceed the deposits, and vice versa. Each cassette must be

docked into the ATM such that stacking of banknotes within the cassette is facilitated if the ATM is a dedicated deposit ATM, and if the ATM is dedicated for withdrawals it must have capabilities for dispensing the banknote from the cassette. And if the ATM is adapted for both deposits and withdrawals the cassette must be docked into the ATM such that both stacking and dispensing of banknotes in the cassette is facilitated.

The stacking and dispensing module may also be arranged in connection with a so-called escrow unit **7**, which is an intermediate storage unit (see FIG. 3).

FIG. 3 is a cross-sectional view schematically illustrating an ATM including stacking and dispensing modules according to the present invention. In the illustrated ATM five cassettes **6** are arranged. One stacking and dispensing module **2** is arranged in connection with each of the cassettes **6**, and in connection with the escrow unit **7**. A user interface **9** where a user may deposit and/or withdraw banknotes from the ATM is provided. The possible routes for banknotes within the ATM are schematically illustrated by small arrows. Additional structural details are also shown in the figure but will not be discussed in detail as they are commonly known technique.

The stacking and dispensing module **2** is configured to be in a banknote stacking mode, which is illustrated in FIG. 5, when banknotes are stacked in the storage unit **6**, and in a banknote dispensing mode, which is illustrated in FIG. 4, when banknotes are dispensed from the storage unit **6**.

FIGS. 4-7 illustrate various view of the stacking and dispensing module according to the present invention. In those figures only features being essential for describing the present invention will be referenced to. Thus, for sake of simplicity numerous structural details, e.g. rollers, guiding members, bars, shafts, etc. will not be described herein.

The stacking and dispensing module comprises a stacking wheel member **12** (see FIG. 2), which is configured to receive and stack banknotes on the tray **8**. The stacking wheel member **12** comprises at least two stacking wheels **14** distributed along a common rotation shaft A having a longitudinal rotation axis designated with dashed lines (see FIGS. 4-6). Preferably, the stacking wheels **14** are distributed along the common rotation shaft A, such that they essentially cover a major part of a banknote **10** on the banknote tray **8**, thereby performing a levelling of the banknote in a horizontal plane. In the module illustrated in FIG. 6, the stacking wheel member

12 comprises four stacking wheels **14** which are essentially symmetrically distributed along the rotation shaft A.

The stacking and dispensing module also comprises a dispensing wheel member **16** (see FIG. 2), which is configured to dispense banknotes from the tray **8**. The dispensing wheel member **16** comprises a predetermined number of dispensing wheels **18** (see FIGS. 4, 5, 7) arranged for rotation around a common first rotation shaft B having a longitudinal rotation axis designated with dashed lines, and that the dispensing wheels **18** are configured to be rotated in a first dispensing direction, see arrow **19** in FIG. 4, when banknotes are dispensed from the storage unit **6**.

The dispensing wheel member **16** is configured to receive banknotes moved from the stack of banknote in the banknote storage unit **6** by a banknote moving member **38**. The banknote moving member **38** is mounted on a shaft **39** which is parallel to shaft B. It is provided with a contact surface **41** made from a high frictional material, e.g. rubber, such that when the moving member **38** is rotated the vertical position of the tray is such that the banknote on top of the stack is moved to the right in the figure to a position where the rotating dispensing wheels, and in particular specific parts **43** of the circumferential edge surfaces, which also are provided with e.g. rubber, continue the movement of the banknote to the right. The rotations of the moving member **38** and the rotating dispensing wheels are synchronised.

The stacking and dispensing module comprises a predetermined number of separating rolls **40** for cooperation with the dispensing wheels **18** during movement of banknotes. The separating rolls **40** are arranged for rotation around a common second rotation shaft C having a longitudinal rotation axis designated with dashed lines, being parallel to shaft B. FIG. 7 is a view from the opposite side compared to FIG. 6 specifically illustrating how the dispensing wheels **18** and the separating rolls **40** are arranged in relation to each other.

In the illustrated example four dispensing wheels **18** and five separating rolls **40** are interleaved such that there is a slight overlap between adjacent rolls and wheels in the virtual plane where the banknote will pass. This results in that the banknote will be slightly corrugated during passage.

The respective contact surfaces on the outer circumferential edge of the dispensing wheels and the separating rolls are made from a high frictional material, e.g. rubber.

Furthermore, the dispensing wheels **18** are advantageously configured to be rotated in a second returning direction, opposite to the first direction, where banknotes are returned to the banknote storage unit **6**.

The rotation of the separating rolls **40** is only allowed for cooperating with the dispensing wheels **18** when the dispensing wheels rotate in the returning direction, but prevented in the opposite direction.

Thus, the dispensing wheels are configured to be rotated in a first dispensing direction where banknotes are dispensed from the cassette and in a second returning direction where banknotes are returned to the cassette, e.g. in case of detection of two or more banknotes that arrives at the same time which may be the case if they stick together, etc.

In one embodiment of the present invention a movement member **42** is provided which is configured to vary the perpendicular distance d between the shafts B and C in dependence of a second control signal **34** from a control unit **30**. The movement member **42** is e.g. a stepping motor. The distance d between shafts B and C is variable, and in particularly it is automatically variable. By varying the distance d it is possible to automatically adapt the module for dispensing banknotes of different thickness, quality, etc. A typical overlap of the dispensing wheel and rollers is 0.25 mm and the variation may be in steps of 0.01 mm.

If the driving current of the DC motor configured to drive the dispensing wheels deviate from a set value a possible reason may be that two or more banknotes stick together and have been moved from the stack by the banknote moving member. The increased thickness of the banknotes results in that a higher torque, and then consequently a higher driving current, is required for rotating the dispensing wheels.

This enables a robust and straightforward detection of non-accepted situations, e.g. situations where two or more banknotes are moved or when a banknote is folded, etc. This detection method obviates the need of dedicated sensors and immediately adapts the dispensing capability to the actual situation, i.e. the thickness of the banknote.

Thus, if it is detected that two, or more, banknotes have been moved from the stack, these are returned to the stack and some further attempts are made, e.g. two or

three. If, after the last attempt, it is still detected that the thickness deviates from an acceptable thickness the two (or more) banknotes will be fed out and rejected.

The stacking wheel member **12** is active both during the banknote stacking mode and during the banknote dispensing mode, and the rotation of the stacking wheel member **12** is configured to be controlled by a first direct current (DC) motor **20** (FIG. 6).

The rotation of the dispensing wheel member **16** is configured to be controlled by a second DC motor **22** (FIG. 6).

The module according to the present invention further comprises a current measuring unit **24** configured to measure the currents **25** applied to drive the first and second DC motors **20**, **22** and to generate current signals **26**, **28** in dependence thereto. There are several methods of measuring current, the most common method is to perform an indirect measurement by measuring the voltage across a precision resistor and using Ohm's law to measure the current across the resistor.

A control unit **30** is provided configured to receive the current signals **26**, **28**, and to evaluate the current signals **26**, **28**.

The control unit is further configured to determine control signals **32**, **34** for various functions of the module in dependence of the evaluation, and to apply the control signals to various parts of the module for controlling the functions. The evaluation of the current signals **26**, **28** comprises comparing current values to predetermined threshold values related to the respective functions.

The functions comprise at least one of controlling the vertical movement of the tray **8** and controlling a dispensing wheel member parameter, which preferably is related to the thickness of one banknote.

In one embodiment the control unit **30** is configured to determine a first control signal **32** in dependence of the current signal **26** from the first DC motor **20**, and to apply this first control signal **32** to a tray movement member **36** to perform vertical movement of the tray **8**.

The stacking wheel member **12** is active in the sense that it is rotated and current is measured both during the banknote stacking mode and banknote dispensing mode. This means that a measure of the friction between the stacking wheels and the top banknote at the stack is determined continuously by measuring the driving current

of the first DC motor. This measure is related to the level of the tray such that a high friction value (higher driving current) means that the tray must be lowered, and vice versa. Acceptable friction values correspond to a range of acceptable vertical levels of the top banknote for achieving high quality stacking and dispensing procedures.

In one implementation the vertical position of the tray is automatically adjusted upwards or downwards e.g. every fourth banknote being dispensed or stacked, respectively. A typical adjustment is 0.25 mm. The measurements performed by the control unit by evaluating the driving current of the first DC motor results in an improved control of the vertical tray level.

To perform the stacking action each stacking wheel **14** is provided with a predetermined number of banknote receiving slots **44**, e.g. three slots. Each slot has an essentially semi-circular curvature running from an outer edge of the wheel in a tangential direction in the outer third part of the radius of the stacking wheel, wherein the radius of the slot curvature essentially corresponds, or is slightly shorter, to the radius of the stacking wheel. Thereby is achieved that the banknote is received and stacked smoothly in that it is only bent as little as possible in its shorter direction.

A banknote enters the slot when the entry opening is positioned upwards and is properly positioned in relation to the route leading the banknote to the module. The banknote is fed into the slot until it reaches the end point of the slot. As the stacking wheel rotates the leading edge of the banknote comes into contact with a banknote stop member **45** which enables smooth delivery of the banknote to the stack in the cassette.

The present invention also relates to an automatic teller machine (ATM) comprising a predetermined number of banknote storage units **6**, wherein each storage unit is provided with a stacking and dispensing module as described above. The ATM may have one or several customer fascia and may be adapted for deposits, withdrawals, and also for combined ATMs, allowing both deposits and withdrawals.

The stacking and dispensing module also comprises a gate member which is used to switch and guide banknotes into the route leading to the stacking wheel. It is controlled by a solenoid switch and is spring-loaded such that it enables a fast and bounce free switching.

In one optional implementation a camera unit is arranged in relation to a deposit tray where a user deposits banknotes, e.g. in relation to the user interface **9**. The camera unit is intended to visually identify the banknote(s) being deposited and capture an image of the banknote(s). The captured image is compared to a corresponding reference banknote image. If the result of the comparison indicates that the deposited banknote differs too much from the reference banknote image the user is notified, either by a message on an interface display or audibly, that the banknote not will be accepted. The reason could be that the deposited banknote is folded or damaged, etc. The user may then remove the banknote, and try once more.

With references to FIG. 3 the user interface **9** will be further described. In one implementation the stacking and dispensing module **2** is arranged in connection with the user interface **9**. A deposit tray **47** is provided where a user may deposit a bundle of banknotes **10**. The deposit tray is hidden by a shutter **13** (see FIG. 1) when the ATM not is in use. When a deposition of banknote is about to take place the shutter **13** will open, e.g. when the user inserts a card. During the opening the shutter will move downwards until its upper edge reaches the level of the deposit tray which makes it easy to deposit a bundle of banknotes. The size of the opening is set in advanced by the ATM administrator in relation to the maximum size of the bundle of banknotes that should be allowed to be deposited, e.g. representing 200, 300, or 500 banknotes. Thus, the shutter **13** is movable and controlled together with the tray **47** such that the tray and shutter enables easy deposition of the banknote bundle. During the next step of deposition the dispensing wheel member together with the moving member will move banknotes from the deposit tray **47** to a banknote storage unit. During this procedure a corresponding measurement of the thickness of the banknotes as described above is performed.

In the following a further embodiment of the automatic teller machine will be disclosed with references to FIGS. 8-14.

A new type of advanced upper unit **52** is applied which is structured to implement an advantageous functionality. This new type of upper unit **52** is structured to be arranged in connection with, and work in combination with, the stacking and dispensing module described above with references to FIGS. 1-7, and in an ATM, provided with a lower unit **54** comprising stacking and dispensing modules, cassettes, and other items described in relation to the ATM disclosed herein. For case of simplicity the stacking and dispensing modules have been obviated in some of the FIGS. 8-14.

In a presently used solution, banknotes which are not accepted by the ATM are returned to the user that is instructed to reinsert/redeposit the banknote once more, e.g. after having unfolded it, or after having flattened it out, etc. This may result in irritation of the user and also has the consequence that the capacity of the ATM is reduced as the queue increases.

An object to be achieved by implementing the new type of advanced upper unit, and a new procedure in relation thereto is to reduce manual interference of ATMs of today when depositing banknotes.

A user deposits a bundle of banknotes on a deposit tray. The banknotes are fed one by one through a detector unit provided with various sensors for determining a number of different parameters of the banknote is dependent of measurements performed by the sensors. These parameters may include to determine the banknote denomination; the banknote quality, e.g. to determine if the banknote is dirty, ink-dyed, etc.; the authenticity of the banknote; if the banknote is folded, etc.

Based upon the state of these parameters it is determined how to handle the banknote.

The alternatives may be:

- Not accept the banknote.
- Accept the banknote.

The criteria for determining if a banknote should be accepted or not accepted may vary in dependence of specific regulation of the country where the ATM is installed.

In the ATM illustrated in FIGS. 8-14 an intermediate storage module is arranged in connection with the detector unit.

The intermediate storage module comprises at least two so-called drum storage units, one dedicated for accepted banknotes, a first drum storage unit (herein also denoted Escrow storage), and one dedicated for non-accepted banknotes, a second drum storage unit (herein also denoted temporary storage).

A drum storage unit is a commonly used type of storage module where banknotes are stored serially, up-winded in a drum. In U.S. Pat. No. 8,186,673 is disclosed one example of a drum storage which may be applicable when realizing the present invention.

The basic idea governing the implementation of the advanced upper unit **52** (see FIG. 8) is to let a banknote that was determined non-accepted by the detection unit pass the detection unit at least a second time without feeding it out to the user. In addition the banknote is turned upside down in comparison to when the banknote first passed through the detection unit during a first detection procedure. By turning the banknote upside down is herein meant that the side of the banknote facing downwards is turned upwards.

Thereby, according to gained experience, some of the non-accepted banknotes will instead be determined as accepted. Naturally, it is possible to turn the banknote one or many additional times and pass the banknote through the detection unit additional times.

Thus, the non-accepted banknotes are serially stored in the second drum storage unit. The banknotes are then fed into the detection unit one more time, in a turned state and being fed through the detection unit in the same direction as the first time.

The detection unit is adapted to only receive banknotes in one feeding direction. This is advantageous in that a less advanced and thus less expensive detection unit is then required which reduces the error rate and the detection unit is therefore more reliable.

It is also important to have the banknotes in a central position, e.g. in a mid-position, of the conveyer belt/transport track. This is an important aspect when the banknotes enter the storage cassettes in the lower part of the ATM in order to provide for an optimal stacking procedure inside the cassette such that a stable pile of banknotes within the cassette is achieved. Therefore, a banknote adjusting unit (or centralizer) C is provided. This unit is configured to centre the banknotes when they are fed along the transport track. The adjusting unit may be provided at various positions along the conveyor belt in the advanced upper unit **52**. One advantageous position is to arrange the adjusting unit C along an upper conveyer route **50** (see FIG. 8) between the ES/TS storage units and the I/O module. As an alternative the adjusting unit C is instead arranged between the I/O module and the detection unit BV. The adjusting unit C is indicated by a rectangle having a dashed borderline, and will be described more in detail below with references to FIG. 13.

FIG. 8 shows a schematic illustration of an automatic teller machine according to an embodiment of the present invention including the advanced upper unit **52**. In the figure the following abbreviations have been used:

- An I/O module—an input/output module where the user deposits/withdraws banknotes.
- An Escrow storage (ES) of drum type, also denoted first drum storage unit. This is a temporary storage unit for deposited banknotes being accepted.
- A Temporary storage (TS) of drum type for non-accepted banknotes, also denoted second drum storage unit. The TS is used for automatic banknote retry if detection is vague, i.e. if the detection unit concludes that the banknote not is accepted according presently applied criteria. It thereby reduces the need for customer intervention. The banknotes are temporarily stored herein and are fed out at least once more and passed through the detection unit. The banknotes are then transported along the upper conveyor route **50**. As the TS is a drum type storage and in combination with the chosen transportation route the banknotes will then be turned upside down, in comparison to when they passed the detection unit before they were stored in the TS.
- A banknote adjusting unit (C). This unit is structured to adjust the banknote to be in a central position at the conveyor belt performing the transportation of banknotes. The banknote adjusting unit is preferably arranged along an upper conveyer belt and prior the banknote is transported to cassettes **6**. As will be discussed below the banknote adjusting unit may be implemented by so-called omni-wheels.
- A banknote validator (BV), or detection unit. It should be noted that banknotes may only pass the detection unit in one direction, in the figure from the right to the left.
- Banknote cassettes (used for recycling purposes) **6**.
- At least one acceptance cassette (used for deposit purposes) **6**.

FIGS. 9 and 10 illustrate the functions during a normal deposit procedure where all deposited banknotes are accepted.

All notes deposited in the I/O module are sent to the Escrow module (ES) via the detection unit (BV) and optionally via the banknote adjusting unit C.

As all banknotes are accepted they are routed to the Escrow module. Thereafter, i.e. when all banknotes have been stored in the Escrow module, they are transported to one or many of the cassettes **6**, via the upper conveyor route **50** and the banknote adjusting unit C.

The bold line illustrates the route of the accepted banknotes from the I/O module to the Escrow module.

FIGS. 9 and 10 illustrate the same procedure, and the only difference is in relation to the cassette part of the ATM in relation to which side the door (DOOR) to the safe is arranged. At the same side as the door is arranged some further storage units are provided which are indicated in the figures by four squares. These may include storage units adapted for e.g. retracted or rejected banknotes. The handling of non-accepted banknotes is governed in accordance with country specific regulations, which not will be further discussed herein.

FIGS. 11 and 12 illustrate the functions where some banknotes are not being accepted, and then being fed through the detector unit again.

Accepted banknotes deposited in the I/O module are sent to the Escrow module via the detection unit (BV) and optionally the banknote adjusting unit C.

Non accepted banknotes are sent to the TS. As discussed above the non-accepted banknotes may include banknotes not possible to detect, forgeries and suspected banknotes.

The bold line illustrates the route of the banknotes. If a banknote was found accepted by the BV the banknote is routed to the ES which is illustrated by a bold line. If the banknote was found non-accepted it is routed to the TS which is illustrated by a bold dashed line. Thereafter when all banknotes are received, the non-accepted banknotes are fed out from the TS, via the upper route **50** and the banknote adjusting unit C and through the detector unit BV once again. Accepted banknotes are then routed to ES and if any non-accepted banknotes are detected after this second passage through the detection unit the non-accepted banknote may be routed to TS, e.g. for one more passage through the detection unit, or may be returned to the user directly via the I/O module without storing it in the TS, or may be fed to a cassette in the lower part of the ATM. Which of these alternatives that applies is e.g. dependent on country-specific regulations.

FIGS. 11 and 12 illustrate the same procedure, and the only difference is in relation to the cassette part of the ATM in relation to which side the DOOR is arranged.

The adjusting unit C is provided with a banknote centring member.

Preferably, the centring member comprises a number of so-called omni-wheels specifically arranged to perform the centring action.

Omni-wheels or poly wheels, similar to Mecanum wheels, are wheels with small discs around the circumference which are perpendicular to the turning direction. The effect is that the wheel can be driven with full force, but will also slide laterally with great ease. These wheels are often employed in holonomic drive systems.

With references to FIG. 13 the function of the banknote centring member according to one embodiment will be described in detail.

In the schematic figure the banknote **10** will enter the banknote centring member from below at centralization station **1** (indicated by a bold number to the left) which is illustrated by a block arrow and the banknote will be transported in that direction. The banknote will then continue through the banknote centring member C and pass centralization stations **2** and **3**.

The banknote centring member comprises a predetermined number (two or more) of omni-wheels **60**, **61** which enables simultaneous movement in a direction perpendicular to the transport direction, which is in the left-right direction in the figure and which is illustrated by dashed double-arrows. The omni-wheels are rotated by motors (not shown) via driving shafts **62**, **63**.

The centralization station **2** is provided with at least one omni-wheel **61** positioned in 90° angle to the transportation wheels **60** coupled to a separate motor being configured to rotate the wheel via the shaft **63** in both clockwise and counter-clockwise direction at different speeds.

At least two optical array units **64** are provided and positioned on equal distances from the centreline **66** of the transport path. When the banknote obstructs the array units the difference of the incoming light between the two array units are measured and the motor is configured to be controlled to move the banknote towards the direction with highest light value. When the light values of the array units are essentially equal the banknote is considered to be centred with respect to the centreline of the transport path and the motor is stopped. The station **2** is now ready to receive the next banknote without any need to reset or reposition any mechanical parts.

The banknote **10** will exit the banknote centring member at station **3** which also is provided with omni-wheels **60** being configured to allow the banknote to move

freely in a direction perpendicular to the transport direction while it is transported in the transport direction. The exit station can be utilized with two wheels on a common shaft **62** or have the wheels separated on individual shafts, which also is applicable for station **1**. In the latter case with separate shafts and an extra motor connected to at least one of the shafts and controlled in a similar way as the centralization station also the skew angle (the banknote's angle relative to the centreline **66** of the transport path) of the banknote may be adjusted by controlling the respective shaft such that the two wheels will have a slightly different speed.

FIG. 14 is a schematic illustration of an ATM where the advanced upper unit is implemented. To the left in the figure is shown a front view of the ATM, and to the right is shown a cross-sectional view of the ATM, where in particular the advanced upper unit **52** is shown.

The present invention is not limited to the above-described preferred embodiments. Various alternatives, modifications and equivalents may be used. Therefore, the above embodiments should not be taken as limiting the scope of the invention, which is defined by the appending claims.

Claims

1. A stacking and dispensing module for use in an automatic teller machine, the module is configured to be arranged in connection with a banknote storage unit comprising a banknote tray on which banknotes are stacked, the stacking and dispensing module is configured to be in a banknote stacking mode, when banknotes are stacked in said storage unit, and in a banknote dispensing mode, when banknotes are dispensed from said storage unit, the stacking and dispensing module comprises:

> a stacking wheel member configured to receive and stack banknotes on said tray, comprising at least two stacking wheels distributed along a common rotation shaft A,
>
> a dispensing wheel member configured to dispense banknotes from said tray, comprising a predetermined number of dispensing wheels arranged for rotation around a common first rotation shaft B, the dispensing wheels are configured to be rotated in a first dispensing direction when banknotes are dispensed from the storage unit, wherein said stacking wheel member is active both during the banknote stacking mode and during the banknote dispensing

mode, and that the rotation of said stacking wheel member is configured to be controlled by a first direct current (DC) motor, and the rotation of said dispensing wheel member is configured to be controlled by a second DC motor, and the rotation of the stacking wheel member and the rotation of the dispensing wheel member are synchronized and controlled by the first and second DC motors,

and wherein the stacking and dispensing module further comprises:

a current measuring unit configured to measure the currents applied to drive said first and second DC motors and to generate current signals in dependence thereto,

a control unit configured to receive said current signals, wherein the control unit is configured to evaluate said current signals and to determine control signals for various functions of said stacking and dispensing module in dependence of said evaluation, and to apply said control signals for controlling the functions that are driven by directional rotation and speed of rotation the dispensing wheel member and the stacking wheel member.

2. The stacking and dispensing module according to claim 1, wherein said evaluation of the current signals comprise comparing current values to predetermined threshold values related to the respective functions.

3. The stacking and dispensing module according to claim 1, wherein said functions comprise at least one of controlling the vertical movement of said tray and controlling a dispensing wheel member parameter.

4. The stacking and dispensing module according to claim 3, wherein said dispensing wheel member parameter is related to the thickness of one banknote.

5. The stacking and dispensing module according to claim 1, wherein the control unit is configured to determine a first control signal in dependence of said current signal from said first DC motor, and to apply said first control signal to a tray movement member to perform vertical movement of said tray.

6. The stacking and dispensing module according to claim 1, wherein said stacking wheels are distributed along said common rotation shaft A, such that they essentially cover a major part of a banknote on the banknote tray, thereby performing a levelling of the banknote in a horizontal plane.

7. The stacking and dispensing module according to claim 1, wherein said stacking wheel member comprises four stacking wheels which are symmetrically distributed along said rotation shaft A.

8. The stacking and dispensing module according to claim 1, wherein said stacking wheel member is active in the sense that it is rotated and current is measured both during the banknote stacking mode and banknote dispensing mode.

9. The stacking and dispensing module according to claim 1, wherein the dispensing wheel member is configured to receive banknotes moved from the stack of banknote in the banknote storage unit by a banknote moving member.

10. The stacking and dispensing module according to claim 1, wherein said module comprises a predetermined number of separating rolls for cooperation with the dispensing wheels during movement of banknotes, said separating rolls are arranged for rotation around a common second rotation shaft C, being parallel to shaft B, and wherein a movement member is provided configured to vary the perpendicular distance d between said shafts B and C in dependence of a second control signal from said control unit.

11. The stacking and dispensing module according to claim 10, wherein said dispensing wheels in addition are configured to be rotated in a second returning direction, opposite to said first direction, where banknotes are returned to the banknote storage unit.

12. The stacking and dispensing module according to claim 11, wherein the rotation of the separating rolls is only allowed for cooperating with the dispensing wheels when rotating in the returning direction, but prevented in the opposite direction.

13. The stacking and dispensing module according to claim 1, wherein each stacking wheel is provided with a predetermined number of banknote receiving slots, and that each slot has an essentially semi-circular curvature running from an outer edge of the wheel in a tangential direction in the outer third part of the radius of the stacking wheel, wherein the radius of the slot curvature essentially corresponds, or is slightly shorter, to the radius of the stacking wheel.

14. An automatic teller machine comprising a predetermined number of banknote storage units, wherein each storage unit is provided with a stacking and dispensing module according to claim 1.

15. The automatic teller machine according to claim 14, wherein the machine comprises an advanced upper unit comprising an input/output module adapted to receive and/or dispense banknotes, a detection unit configured for passage of banknotes in one direction and arranged to detect various parameters of banknotes to determine if a banknote is accepted or not accepted, an intermediate storage module comprising two drum storage units including a first drum storage unit for accepted banknotes and a second drum storage unit for non-accepted banknotes.

16. The automatic teller machine according to claim 15, wherein non-accepted banknotes are controlled to pass the detection unit at least one more time.

17. The automatic teller machine according to claim 16, wherein the upper unit is provided with a banknote route such that the banknote is turned upside down every consecutive passage through said detection unit.

18. The automatic teller machine according to claim 15, wherein non-accepted banknotes stored in said second drum storage unit are controlled to pass the detection unit at least one more time.

19. The automatic teller machine according to claim 15, wherein said upper unit comprises a banknote adjusting unit configured to adjust said banknote on a transport path to be in a central position of said path.

20. The automatic teller machine according to claim 19, wherein said banknote adjusting unit comprises one or more omni-wheels.

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